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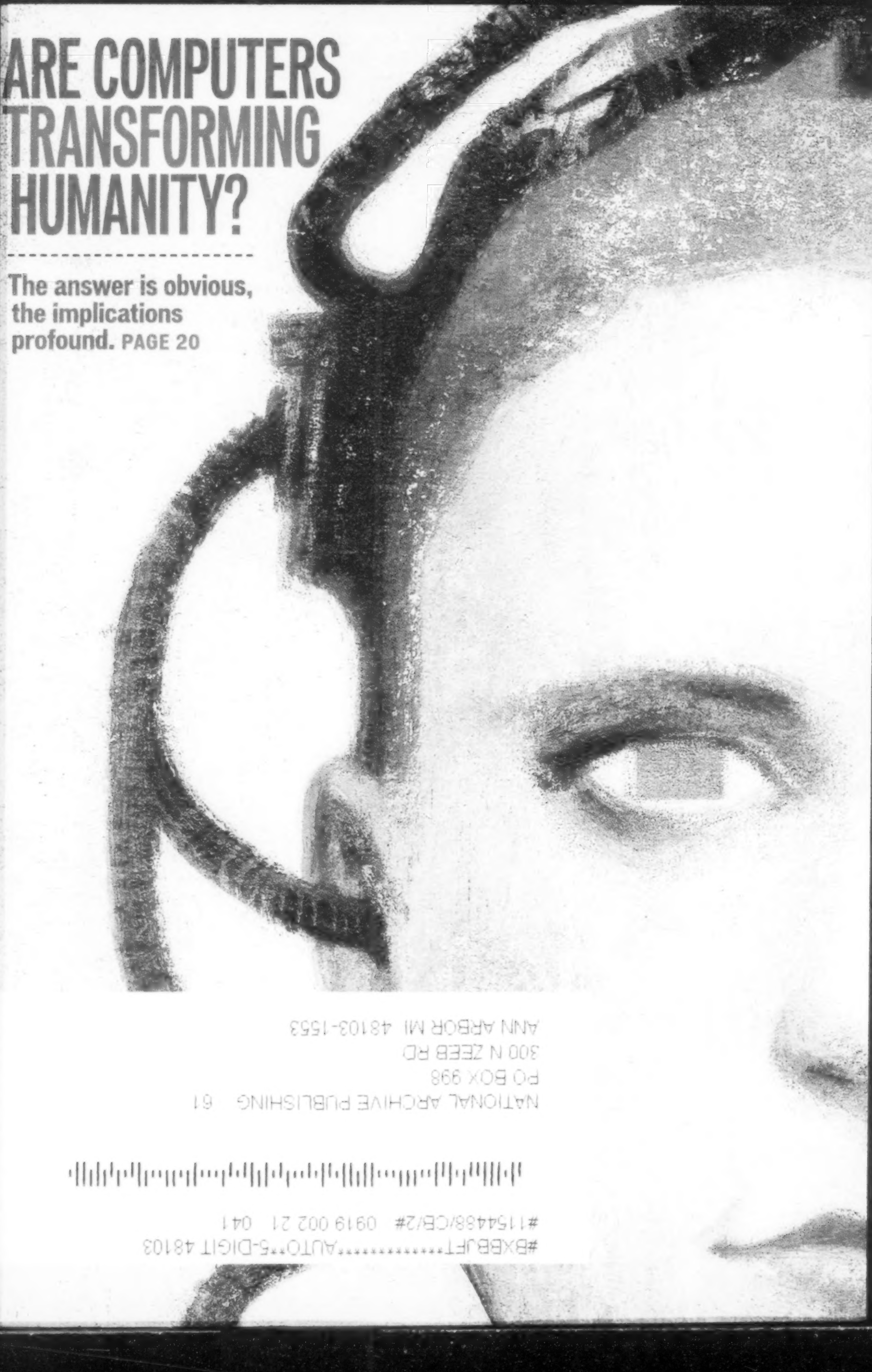

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The answer is obvious, the implications profound. PAGE 20

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NATIONAL ARCHIVE PUBLISHING 61
PO BOX 998
300 N ZEEB RD
ANN ARBOR MI 48103-1553

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MAY 18, 2009
VOL. 43, NO. 19 $5/COPY

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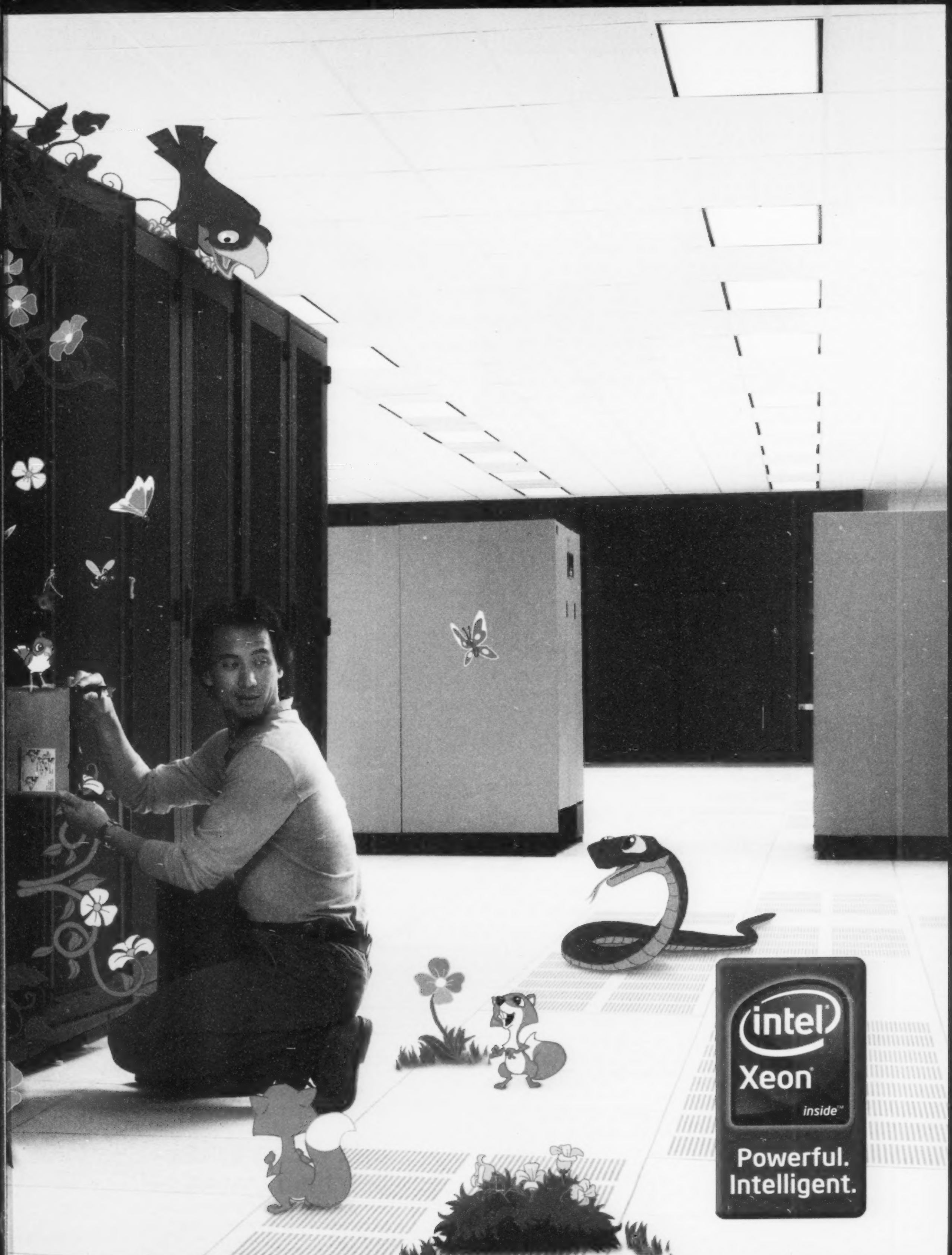
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COMPUTERWORLD ■ MAY 18, 2009

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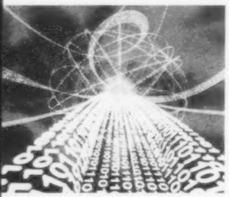
6 Heartland Payment Systems says it has spent or set aside more than **$12.6 million** to cover costs related to a **massive data breach** it discovered in January. | **Clearwire** and **Cisco** partner up to expand **WiMax** services **nationwide.**

8 NASA astronauts installed a new computer on the **Hubble Space Telescope** during the first of five scheduled **spacewalks.**

10 Start-up Costs Slow Spread of De-duplication. Though the technology has demonstrated that it can cut long-term costs and improve disaster recovery, only about 30% of companies worldwide have deployed some form of it to date.



12 Changed Antitrust Rules Could Curb Tech Mergers. The repeal of a short-lived Bush-era policy signals a more aggressive approach toward antitrust enforcement that could blunt M&A activity by acquisitive tech vendors like Google, Oracle and IBM.

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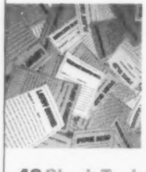

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A few simple steps can keep a green IT policy from entangling your company in an ecological disaster.

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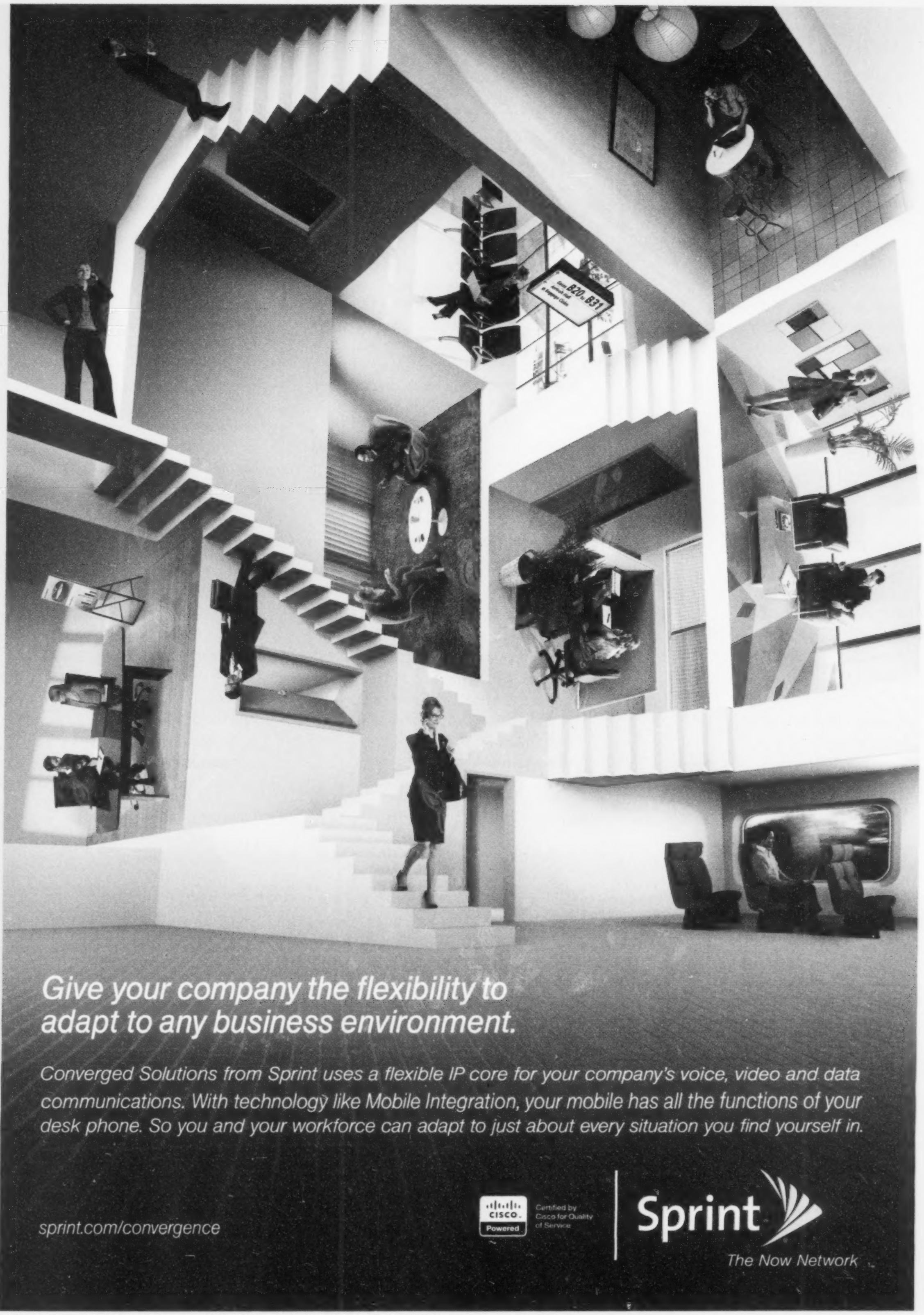
Most companies lack PC power management programs, which means they're wasting energy – and money.



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■ ONLINE CHATTER

RESPONSES TO:

Can Obama Curb Offshoring With Tax Code?

May 4, 2009

Writer Patrick Thibodeau has hit on exactly the core issue. IT companies aren't generating new income within foreign countries. What they are doing is replacing American workers with cheaper labor to perform outsourcing work on contracts they already have — many from other American companies! With some accounting magic, it becomes sheltered "overseas profits." It's a scam that has cost millions of American jobs and billions in unpaid taxes.

■ **Submitted by:** *Anonymous*

This type of protectionism is a violation of WTO rules. India must take its case to the WTO. But is a trade war with India in the interest of the U.S.? What happens if India boycotts Boeing in favor of Airbus, or kicks out Coke, McDonald's and Pizza Hut?

■ **Submitted by:** *Vivek*

RESPONSES TO:

In China, $700 Puts a Spammer In Business

May 8, 2009

The only way to stop all of the spam, phishing and botnets is to go after the ISPs. They are the gateways to the rest of the Internet for everybody who wants or needs to get there. They more than anyone else have the ability to track, monitor and stop this type of activity. They should be held accountable, so that if they don't stop or at least report abusers, they are at risk of losing their backbone access.

I would be willing to pay an extra Internet usage tax in order to pay for the overhead. I suspect my attitude would be shared by anybody who thinks about how much of an expense is associated with protecting systems against these types of attacks.

■ **Submitted by:** *Anonymous*

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PARAMOUNT

Sizing Up Security In *Star Trek*

Ira Winkler sees lessons for IT at every turn in the reboot of the old franchise.

Do Sci-Fi Films Get IT Right?

Real-time e-surveillance? Absolutely. Genetic engineering? We're well on our way. Warp engines? Not so much.

OpenOffice.org 3.1: The Next Generation

This free, open-source alternative to Microsoft Office takes a significant step forward.

Using Social Networks To Find an IT Job

LinkedIn, Facebook and Twitter can save you from disappearing in a sea of anonymous résumés.

Windows 7's XP Mode Works, But Is It Worth the Trouble?

HANDS ON: Windows 7's much-touted XP Mode will let you run legacy apps, but only if you've got the right hardware and the patience to set it up.

News Digest

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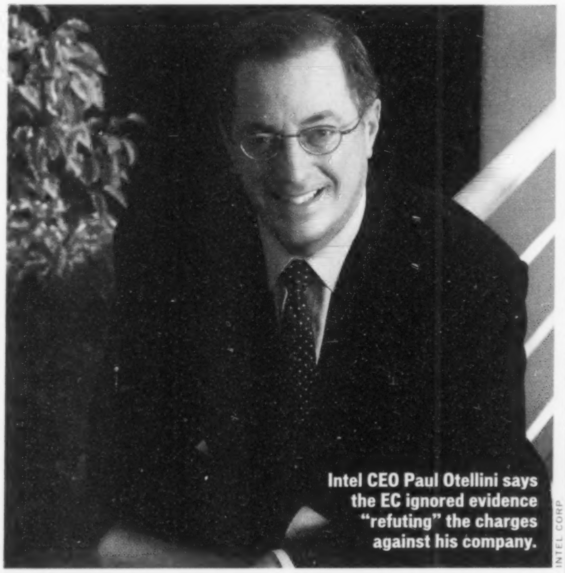
THE WEEK AHEAD

MONDAY: The EMC World 09 user conference kicks off in Orlando and continues through Thursday.

TUESDAY: The Interop IT conference and expo opens in Las Vegas. Also, Hewlett-Packard is scheduled to announce financial results for its second fiscal quarter.

WEDNESDAY: The sixth annual MIT Sloan CIO Symposium, whose theme this year is "Sustaining CIO Leadership in a Changing Economy," takes place in Cambridge, Mass.


Intel CEO Paul Otellini says the EC ignored evidence "refuting" the charges against his company.

INTEL CORP

LEGAL ISSUES

Intel Set to Appeal EC's $1.44B Antitrust Fine

INTEL CORP. said it plans to appeal last week's European Commission decision to fine the company $1.44 billion for violating antitrust laws.

The EC found Intel guilty of paying rebates to computer manufacturers and to Europe's largest IT retailer, Media Markt, in order to keep systems based on chips from rival Advanced Micro Devices Inc. off of store shelves. Although the rebates did result in lower retail prices for PCs, EC Competition Commissioner Neelie Kroes contended that they left consumers without a choice of technologies.

Dean McCarron, an analyst at Mercury Research, noted that the substantial fine "amounts to about $23 for every CPU [Intel] sold in Europe last year."

During a hastily arranged press conference, Intel CEO Paul Otellini argued that the EC "ignored or disregarded" evidence "refuting" the antitrust charges. "There were a number of documents from OEMs or between Intel and OEMs that refute what was claimed here," he said.

Otellini disputed a key EC allegation: that Intel paid "conditional" rebates to PC makers to prevent them from purchasing chips from competitors. The EC "alleged exclusive deals but couldn't find them, so it said we must have hidden [the evidence]," he said, adding that the EC "got all of the documents that they wanted . . . so I'm really baffled."

Michael Cooper, an antitrust attorney at Bryan Cave LLC, criticized the EC's decision. "It is hardly clear that the EU's action will benefit consumers. The consumer rarely benefits when enforcers take actions to protect less-efficient firms from the rigors of competition."

Kroes said the antitrust action will protect consumers. "Intel has harmed millions of EU consumers," so the large fine — the largest antitrust penalty the EC has ever levied against a single company — should "come as no surprise," she said.

If Intel fails in its appeal, McCarron said the company's pricing structure could become "less complicated," with no more rebates.

— Eric Lai, with Paul Meller of the IDG News service

OPERATING SYSTEMS

Windows 7 On Track for Holiday Sales

Microsoft Corp. is on track to wrap up work on Windows 7 and ship it to computer makers in August, a company executive said last week.

Steven Sinofsky, senior vice president of the Windows engineering group, said in a blog post that "if the feedback and telemetry on Windows 7 match our expectations," the next-generation operating system "will enter the final phases of the [release to manufacturing] process in about 3 months."

That schedule would get Windows 7 into RTM mode around Aug. 11. From there, if Microsoft adheres to the schedule it followed with Windows XP, Windows 7-based PCs should be available around Oct. 11, in time for the start of the holiday shopping season.

> **"If the feedback . . . on Windows 7 [matches] our expectations, we will enter the final phases of the RTM process in about 3 months.**
>
> **STEVEN SINOFSKY**, MICROSOFT CORP.

Sinofsky did note that the schedule could change, saying, "The quality of the product and a smooth finish are the most important criteria."

– GREGG KEIZER

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DATA SECURITY

Heartland Breach Cost Firm $12.6M – So Far

HEARTLAND Payment Systems Inc. last week disclosed that it has so far spent or set aside more than $12.6 million to cover costs related to a major data breach that the credit card payment processor disclosed in January.

The company blamed the breach in part for a loss in its latest quarter.

In a conference call to discuss the company's quarterly results, Heartland CEO Robert Carr said the bulk of the breach costs so far are from a fine imposed by MasterCard Inc. Carr didn't disclose the amount of the fine, estimated at $7 million by Gartner Inc.

Carr added that Heartland plans to appeal the fine. MasterCard claimed that the processor had failed to respond appropriately after it was notified of a potential breach. But Heartland believes that it did respond properly and that "upon discovering the intrusion, it took immediate and extraordinary action to address the intrusion," Carr said.

In a statement to *Computerworld*, Mastercard said that it "believes the fines it imposed were warranted and consistent with its rules."

Princeton, N.J.-based Heartland is one of the largest payment-processing companies in the country, with about 250,000 customers. It announced on Jan. 20 that intruders had broken into its systems several months earlier and potentially compromised data on as many as 100 million credit and debit cards.

The intrusion is believed to have started last May, though it remained undiscovered until January. The company was warned earlier by credit card companies about suspicious activity related to transactions it had processed.

The spending or setting aside of $12.6 million so far "seems reasonable based on what they have publicly talked about," said Gartner analyst Avivah Litan. But she added that "the case still remains shrouded in too much mystery to know for certain what other potential damages will add up to."

— Jaikumar Vijayan

Short Takes

■ Microsoft Corp. released a single patch that fixes 14 separate vulnerabilities, 11 of which were rated "critical," including a six-week-old bug in its PowerPoint software. Hackers could exploit the flaw by duping a user into opening a malformed PowerPoint file.

■ Hewlett-Packard Co. has recalled about 70,000 lithium-ion batteries used in several HP and Compaq computer models. The U.S. Consumer Product Safety Commission said the batteries pose a fire hazard.

■ Rimini Street Inc., a provider of third-party support services for Oracle apps, announced plans to offer support packages for multiple SAP product lines.

■ Apple Inc. patched 67 vulnerabilities in the Mac OS X operating system. Twenty-six of the vulnerabilities carried Apple's "arbitrary code execution" label, which means the flaws are critical and could be exploited to hijack a Macintosh computer. It was the company's largest security update since March 2008.

MOBILE & WIRELESS

Cisco Takes Aim at WiMax

CLEARWIRE CORP. and Cisco Systems Inc. last week announced an alliance aimed at expanding high-speed WiMax wireless services nationwide using Cisco products as the core network infrastructure.

The companies said that Clearwire is already testing and certifying an IP Next-Generation Network infrastructure based on Cisco 7600 routers and Cisco switches and firewalls.

Financial terms of the deal weren't revealed, but analysts noted that Cisco could earn millions of dollars by selling Clearwire its routers and optical networking gear for the WiMax network, which is slated to be rolled out in 80 U.S. cities by the end of 2010. The analysts did note that Cisco's revenue from the deal will largely depend how well WiMax technology catches on in the U.S.

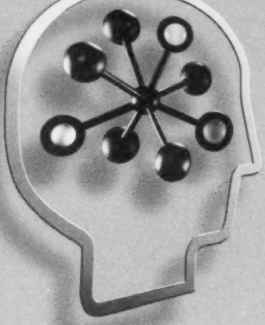
> **"Since WiMax has gotten a bad rap, Clearwire needs another heavyweight backer. So [Intel and Google] could be leaning on Cisco to join the effort.**
>
> **JACK GOLD,** ANALYST, J.GOLD ASSOCIATES LLC

The companies said that Cisco also plans to offer its Linksys routers for home and small-office settings. The routers would bring in a signal from outside via WiMax wireless transmission mode and broadcast it throughout the location via Wi-Fi mode.

Analysts noted that Cisco's entry into the WiMax business isn't surprising, in light of its decision to pay $330 million to buy Navini Networks Inc., a start-up developer of WiMax broadband wireless access systems, at the end of 2007.

"Cisco has been sitting on this opportunity for a while," noted independent analyst Jeff Kagan.

- MATT HAMBLEN



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IT IN GOVERNMENT

Shuttle Crew Installs New Backup System on Hubble

Atlantis launches from Florida's Kennedy Space Center last Monday.

NASA ASTRONAUTS last week installed a new backup computer on the Hubble Space Telescope during the first of five spacewalks planned by the crew of the space shuttle *Atlantis*.

Last fall, the Hubble's primary computer failed and its backup system was remotely activated to take its place. NASA officials noted that the malfunction was the first to require the installation of a new system on the Hubble telescope since it was launched into space 19 years ago.

The computer, called the Science Instrument Command and Data Handling Unit, is designed to send commands to Hubble's scientific instruments and format science data so it can be transmitted to Earth.

Atlantis lifted off last Monday on an 11-day mission focused on repairing and upgrading the telescope, which has not been serviced since 2002. Shortly after arriving at the Hubble on Wednesday, the seven-astronaut team used the shuttle's 52-foot robotic arm to grab hold of the telescope and gently pull it into *Atlantis'* payload bay.

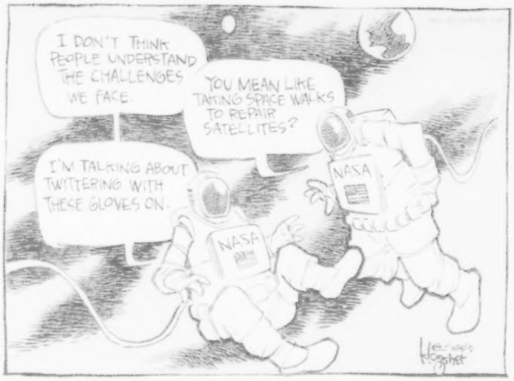
The repairs and additions should make Hubble far more powerful than it has ever been. And they will enable the Hubble to make more — and more-important — discoveries in the next five years than it has in the past two decades, said Ed Ruitberg, deputy program manager for the Hubble Space Telescope. The repairs are expected to keep the telescope operating for at least five more years.

One of the *Atlantis* astronauts, Mike Massimino, has started reporting on the mission using Twitter Inc.'s social network. His first tweet — "Launch was awesome!! I am feeling great, working hard, & enjoying the magnificent views" — came one day into the voyage.

— Sharon Gaudin

BETWEEN THE LINES

By John Klossner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I'M TALKING ABOUT TWITTERING WITH THESE GLOVES ON.
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BENCHMARKS LAST WEEK

IDC said that Advanced Micro Devices Inc.'s share of processor shipments reached 22.3% during the first quarter, up 4.6 percentage points from the previous quarter, while Intel Corp.'s share fell 4.7 percentage points to 77.3%.

Samsung Electronics Co. shipped a 32GB NAND memory card, double the highest capacity of cards previously available.

SIX YEARS AGO: The SCO Group Inc. said it was abandoning its Linux business and warned commercial Linux users that they might be liable for violations of SCO intellectual property that it alleged exist in the Linux source code.

Global Dispatches

Nortel Opens New Ops Center in India

BANGALORE, India – Nortel Networks Corp. last week announced that it has opened a global network operations center here to help remotely manage and support the networks of its carrier and enterprise customers in Asia, Europe and North and South America.

The Bangalore facility is Nortel's fifth network operations center worldwide, joining others in North America, Europe, China and Gurgaon, India.

The company decided not to expand in Gurgaon but to instead set up a network operations center in Bangalore to provide disaster recovery capabilities to its customers, said Suresh Kumar, Nortel Asia-Pacific vice president for managed service delivery.

The company declined to discuss staffing plans for the new facility but said it is designed to house 300 workers.

John Ribeiro,
IDG News Service

Justice Ministry Seeks New CIO

LONDON – The U.K. Ministry of Justice has begun a search for a new CIO just weeks after the National Audit Office issued a report criticizing the agency's overdue, overbudget National Offender Management Information System project.

The new CIO will replace Andrew Gay, who has held the post for less than a year, and will oversee an IT department of 1,100 people. The salary is listed as £160,000 ($242,000 U.S.) plus benefits.

The audit office had criticized the ministry in March for its overly optimistic estimates for the offender management system, contending that its projected cost has doubled to £513 million ($777 million U.S.).

Siobhan Chapman,
Computerworld U.K.

BRIEFLY NOTED

Landis+Gyr, a Zug, Switzerland-based provider of energy metering and management products, has extended its IT outsourcing contract with Unisys Corp.'s Swiss subsidiary by five years. The monetary value of the deal was not disclosed. The Unisys unit provides end-user support and data center services to Landis+Gyr.

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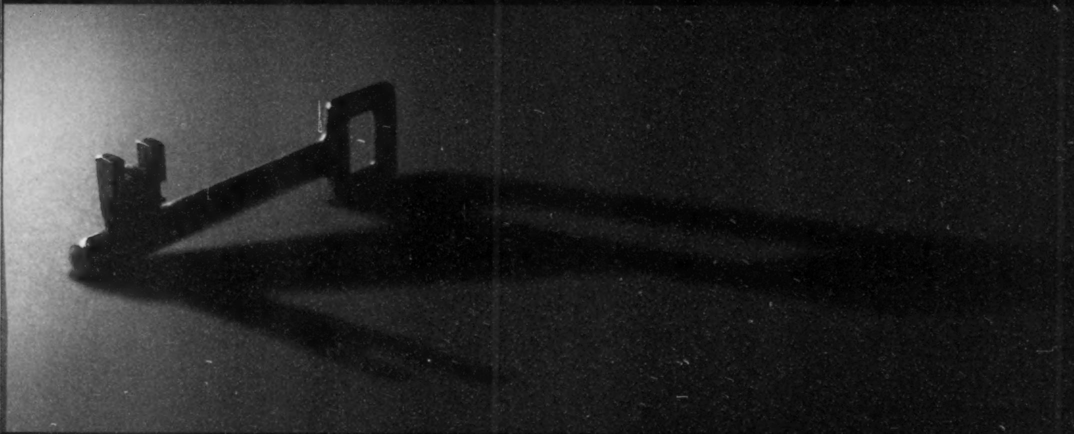

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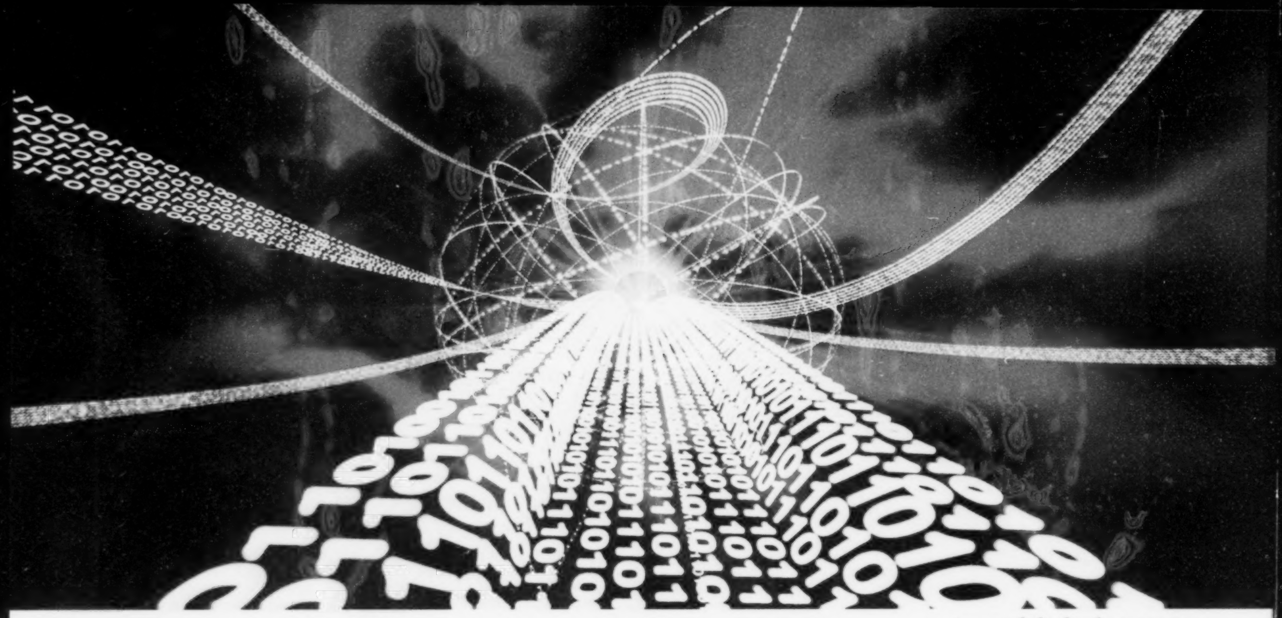


Start-up Costs Slow Spread of De-duplication

IT is leery even though the technology promises to cut costs and storage needs.

By Lucas Mearian

WHILE data de-duplication is a relatively easy way for companies to consolidate storage systems, the technology has yet to attract the widespread attention of IT managers. According to Gartner Inc., only about 30% of corporations have deployed any form of de-duplication technology.

Gartner says the technology can cut storage needs by a ratio of 20:1 to 30:1 on average — far less than vendor claims of 200:1 to 300:1, but still enough to greatly reduce network bandwidth requirements and stave off storage hardware purchases by making better use of existing equipment. The technology could also eliminate the need for costly tape backup systems.

Gartner analyst Valdis Filks suggested that despite the potential benefits, IT managers remain reluctant buyers of the technology because of high start-up costs.

"De-duplication is becoming very fashionable and lays claim to large cost savings, but quite a few companies I speak to get turned off by the purchase price," Filks said.

Simply put, data de-duplication, or single-instance storage, involves the elimination of redundant data. Hash algorithms mark data blocks with unique numbers, and those numbers are compared so that duplicate pieces of data can be left out of the storage process.

To date, the primary corporate use of the technology has been for e-mail archiving. The benefits of that application are obvious when you realize that a single e-mail can represent thousands of copies of one attachment.

Today's de-duplication tools are mostly point products, such as prepackaged appliances that sit between a primary disk storage system and the backup process, software that runs on commercially available host systems, or virtual tape library (VTL) disk subsystems. The market is starting to expand because companies like Sun Microsystems Inc. and NetApp Inc. have begun shipping tools that provide de-duplication on primary storage systems.

Analysts say that as IT managers consider deploying de-duplication technology, they should keep in mind that it will continue to expand beyond point solutions to primary storage systems. "You should definitely roll it out today but implement something they can adapt and change when de-duplication becomes ubiquitous in other areas of the [data center]," Filks said.

The top makers of de-duplication point products include Data Domain, Sepaton, EMC's Avamar unit, Diligent Technologies, FalconStor Software (whose technology is resold by vendors like IBM, Sun and EMC) and Quantum.

Some users have found that de-duplication can deliver significant benefits in certain specific environments, such as at companies running older tape library systems.

Boston Medical Center was able to reduce 400TB of data stored on its tape libraries and secondary disk storage system to 3.5TB while also eliminating the need for tape backup by using Data Domain Corp.'s DD690 virtual tape library de-duplication system, said Brad Blake, director of IT.

The medical center is projecting that the product's return on investment will total $300,000 to $400,000 over the next three years. In addition, Blake credits the tool with eliminating the need for Iron Mountain Inc.'s data archiving services, further cutting costs over the period by about $70,000.

Blake noted that while the two Data Domain VTLs were expensive — $700,000 for both — the price is about $400,000 less than it would have cost to replace the medical center's aging backup infrastructure, which included a tape library from ADIC fronted by a Centera secondary disk array from EMC.

Blake's IT shop manages medical, clinical, e-mail, database, HR and financial data stored on more than 120 application servers. Boston Medical Center's data grows at 40% to 50% annually. The hospital uses one Data Domain box to back up primary data and then replicates that data to a second array at an off-site facility for disaster recovery purposes.

"Initially, I was nervous about stepping into a space not a lot of other people had tried yet, but Data Domain had another customer that I was able to chat with. Taking time to understand the technology and talking to someone else using it — learning what he knew — gave me a comfort level," Blake said.

Computer technician Paul Rivera's comfort level sank when his company's first attempt at de-duplication failed.

When his employer, ENGlobal Corp. wanted to consolidate its e-mail archive, it initially turned to a service provider, Verizon Communications Inc., which used EMC's Avamar software to do the job. But some of ENGlobal's older application servers had problems with Avamar's agents and wouldn't run backups.

James Saar, backup administrator at Houston-based ENGlobal, a provider of engineering and professional services, noted that Verizon had someone else managing the Avamar product, so it took two or three tiers of people to get the backups working again.

> **"With de-duplication, we can also restore anytime within the retention period and it's all live. There's no need to worry about finding tapes in a vault. Being able to access data immediately really alleviates management overhead for a backup system.**
>
> **JAMES SAAR,** BACKUP ADMINISTRATOR, ENGLOBAL CORP.

So three months ago, ENGlobal decided to bring the de-duplication process in-house using Symantec Corp.'s PureDisk software and NetBackup servers.

With PureDisk, agents can either be placed on host servers in remote sites in order to de-duplicate data prior to transport over a WAN to a data center for backup, or PureDisk can be used at the remote site for local backup and quick restore.

Rivera said ENGlobal didn't give up on de-duplication, because it believed that the technology could significantly slow the growth of storage requirements, enable the company to avoid using tape for restore purposes, and reduce the need for expensive service contracts. He said his company is amortizing the cost of the equipment to about $10,000 per month over the next three years, or about 25% of the price it was paying for Verizon's hosted backup services.

With Symantec's help, Rivera and his team took about three weeks to set up PureDisk agents at three remote sites. Each site backs up about 1TB of data per week.

"With de-duplication, we can also restore anytime within the retention period and it's all live," Saar said. "There's no need to worry about finding tapes in a vault. Being able to access data immediately really alleviates management overhead for a backup system."

In all, ENGlobal's backup systems store about 800GB from three offices, down from 4TB prior to the installation of the Symantec tools.

ENGlobal has one PureDisk appliance in its main data center connected to a single 8TB iSCSI unit, and a second appliance in its Washington office that's connected to a Dell PowerVault MD1000 DAS array.

DIFFERENCE OF OPINION

Scott Heffner, network operations manager at Wentworth Douglas Hospital in Dover, N.H., praised the EMC Avamar software that had stalled ENGlobal's de-duplication plans.

The hospital rolled out Avamar last October to replace a poorly performing IBM Tivoli backup system. Today, he said, "we're seeing 100:1 ratios. It's unbelievable. That means when we would have been backing up 100GB in the past, we're only having to back up 1GB of data now." Heffner noted that Wentworth Douglas' SAN contains about 60TB of data.

While the hospital implemented de-duplication to ensure fast restoration of data in the event of a disaster, the technology has significantly cut its backup costs as well, Heffner said. He noted that the annual cost of backing up 91 nodes using the Tivoli storage products was about $121,000. Today, Wentworth Douglas expects to pay $100,000 for 140 nodes.

"The only thing going through our heads [at first] was how we could improve our disaster recovery capability," Heffner said. "When things are at their worst, hospitals are expected to be at their best, and how can we be that if our [records] system can't come up for three days after a disaster?"

The hospital runs the Avamar software on Dell PowerEdge 2950 servers. It also uses EMC's Clariion Disk Library for backups in order to keep all data online for fast recovery.

Its data center is in transition to a virtual environment, and 100 of the company's 150 virtual machines now back up through the Avamar appliance, Heffner said. The majority of data going to the de-duplication appliance comes from Exchange e-mail servers, medical forms servers, Citrix servers, the hospital's Web portal server and a medical notes transcription server. ■

Changed Antitrust Rules Could Curb Tech Mergers

The DOJ repeals a Bush-era policy that 'raised hurdles' in federal antitrust probes. **By Grant Gross**

A SHIFT in U.S. Department of Justice antitrust policy announced last week could blunt the expansion or merger plans of IT vendors, according to legal experts.

In speeches last week before the Center for American Progress and the U.S. Chamber of Commerce, Christine Varney, assistant attorney general in charge of the DOJ's antitrust division, said that the agency is repealing a policy established under George W. Bush that "raises many hurdles to government antitrust enforcement." The move signals a more aggressive approach to antitrust enforcement under President Barack Obama.

The short-lived Bush administration policy, included in a report released by the DOJ last September, had called for the agency to proceed slowly when investigating potential abuses of antitrust laws, Varney said.

The change in policy could mean that the department will look more closely at technology vendors such as Google Inc., Oracle Corp. and IBM, which, according to critics, have taken actions that raise antitrust concerns in recent months.

For example, Google continues to face critics who contend that it has a near monopoly in online search advertising. In fact, the DOJ late last year would not approve a proposed advertising partnership between Google and rival Yahoo Inc.

Google officials note that the company has initiated meetings with lawmakers, journalists and others in an effort to explain its positions on business competition and perhaps ease critics' fears.

"As Google has grown, the company has naturally faced more scrutiny about our business principles and practices," acknowledged Adam Kovacevich, senior manager for global communications and public affairs at Google, in a blog post earlier this month. "We believe that Google promotes competition and openness online, but we haven't always done a good job telling our story."

Varney said her comments weren't directed at any one company or industry, but she did note that the DOJ would take a close look at the ever-changing high-tech and Internet industries.

"We plan to devote attention to understanding the unique competition-related issues posed by [high-tech] markets," she said in the speech. "In the past, the antitrust division was a leader in its enforcement efforts in technology industries, and I believe we will take this mantle again. In so doing, I am cognizant that we must find the right balance to ensure that when intellectual property is at issue, competition is not thwarted through its misuse or illegal extension."

"We plan to devote attention to understanding the unique competition-related issues posed by [high-tech] markets.

CHRISTINE VARNEY,
ASSISTANT ATTORNEY GENERAL,
U.S. DEPARTMENT OF JUSTICE ANTITRUST DIVISION

Steve Newborn, an antitrust lawyer at Weil, Gotshal & Manges LLP, said that the DOJ move could simply shift antitrust enforcement back to the standards long upheld before last year's changes. However, he suggested that companies with dominant positions in their markets should closely watch how the new policies play out. "The rules have changed," Newborn said.

Bruce McDonald, a partner at law firm Jones Day and a former deputy assistant attorney general in the DOJ's antitrust division, agreed, adding that technology vendors should be cautious in plotting merger activity.

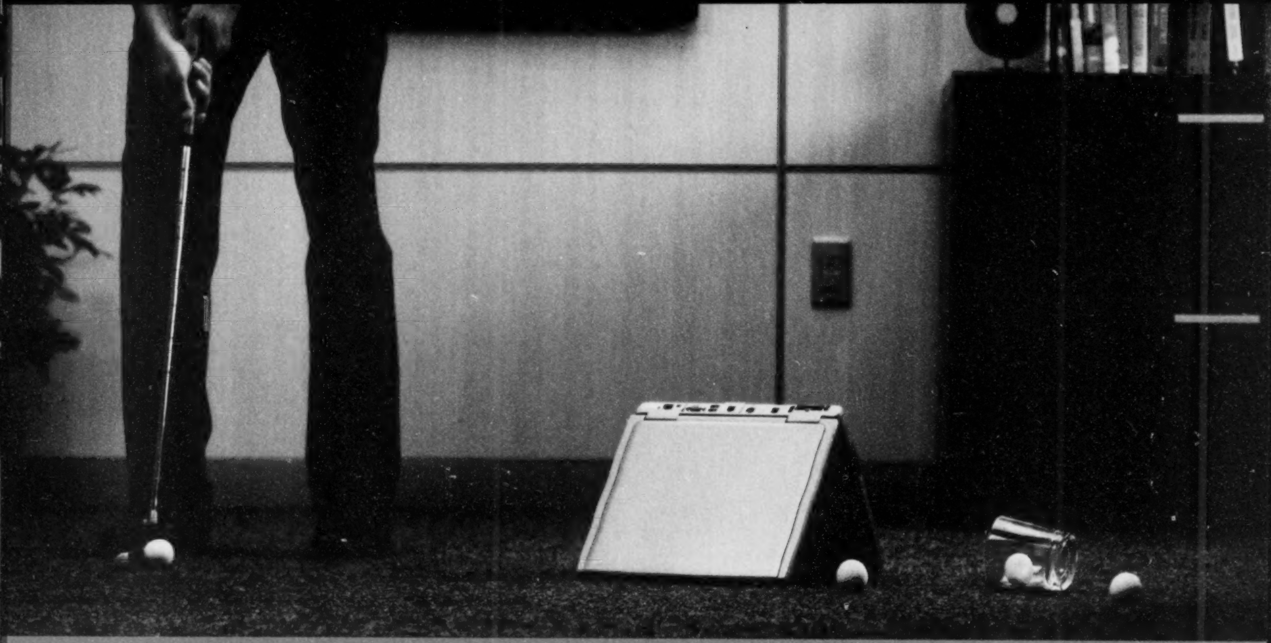
Varney's signal that the DOJ might look at new ways to measure antitrust behavior in technology industries could make the agency's actions a "little less predictable," McDonald said. "You very likely will see new enforcement actions."

He added that the lack of hard rules might make high-tech companies reluctant to follow through on mergers that would normally be acceptable to the DOJ.

The Computer & Communications Industry Association, a Washington-based trade group that supports strong antitrust enforcement, praised the DOJ's policy shift. "It's clear we have a new sheriff in town," said Ed Black, the group's president and CEO. "So much was ignored by the last administration, a main job will be catching up."

In an e-mail, Black said that Varney's announcement indicates that the U.S. intends to return to the "main track" of antitrust enforcement and operate in parallel with the European Union. The DOJ is "going to be aggressive, but careful," he added. "And I think that's going to be an appropriate balance." ■

Gross *is a reporter for the IDG News Service.*



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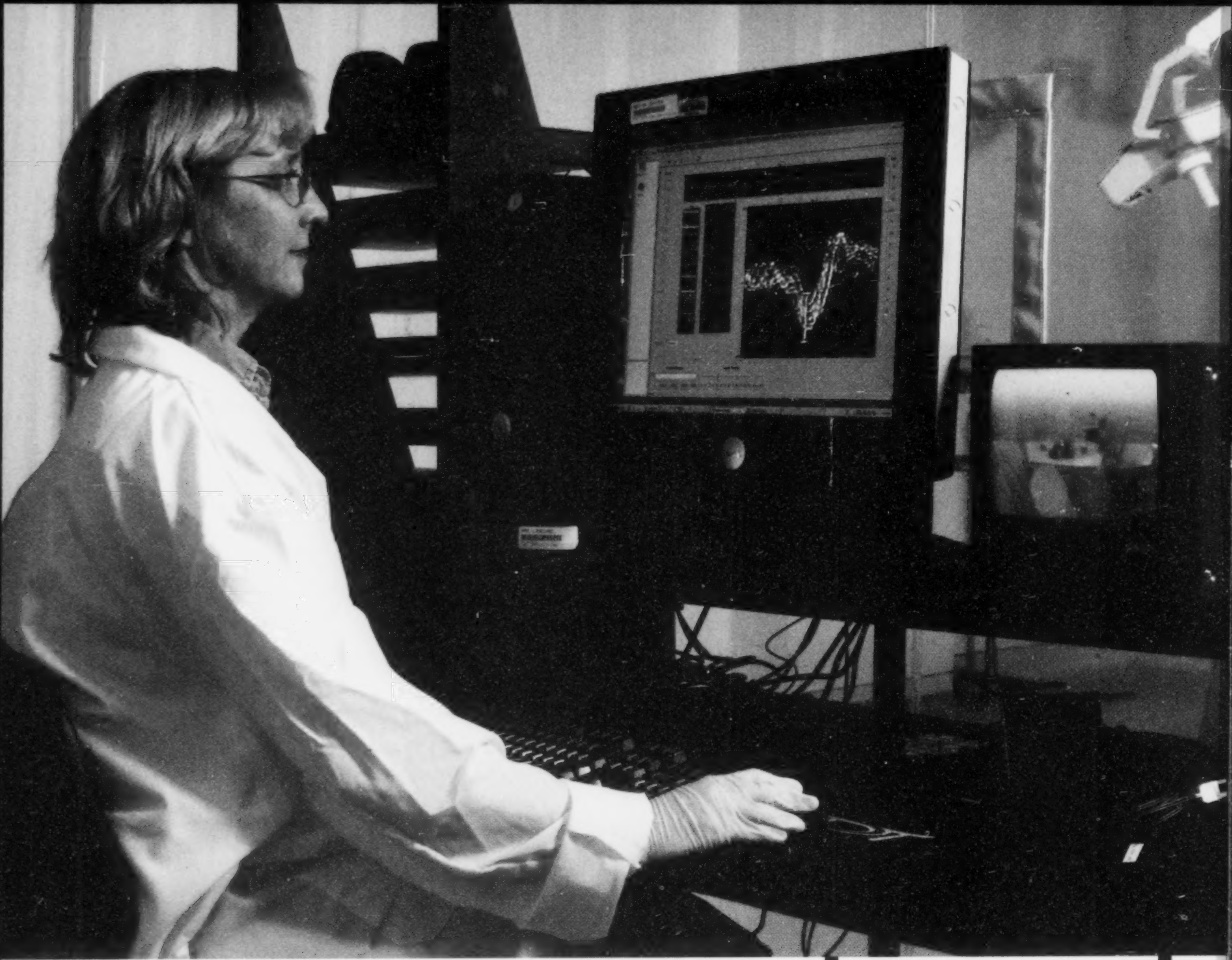

THE GRILL

Dawn M. Taylor

The researcher talks about **decoding brain signals** to bring sight, movement and sensation **to the disabled.**

Dawn M. Taylor is a research scientist at the Cleveland Functional Electrical Stimulation Center, a consortium of partners Case Western Reserve University, the Cleveland VA Medical Center and MetroHealth Medical Center. She is a co-author of Brain-Computer Interfaces: An International Assessment of Research and Development Trends *(Springer, 2008), which discusses how years of research are beginning to produce practical tools for the disabled.*

Why is research on brain-computer interfaces taking off now? Back in the early 1970s, University of Washington professor Eberhard Fetz connected individual neurons from a monkey's brain to a voltmeter. He used a simple analog circuit to convert the firing rate of the recorded neuron into a voltage. If the monkey changed the neuron's firing rate and got the voltmeter dial to go to the right, for example, he'd get a re-

Continued on page 18

Dossier

Name: Dawn M. Taylor

Title: Assistant professor of biomedical engineering

Organization: Case Western Reserve University

Location: Cleveland

Favorite technology: "Brain electrodes . . . of course."

Favorite nonwork pastimes: "Playing with my ferrets, hiking and making old junk into art."

Philosophy in a nutshell: "Question everything; live and let live."

Something people don't know about her: "I originally went to college to study animation."

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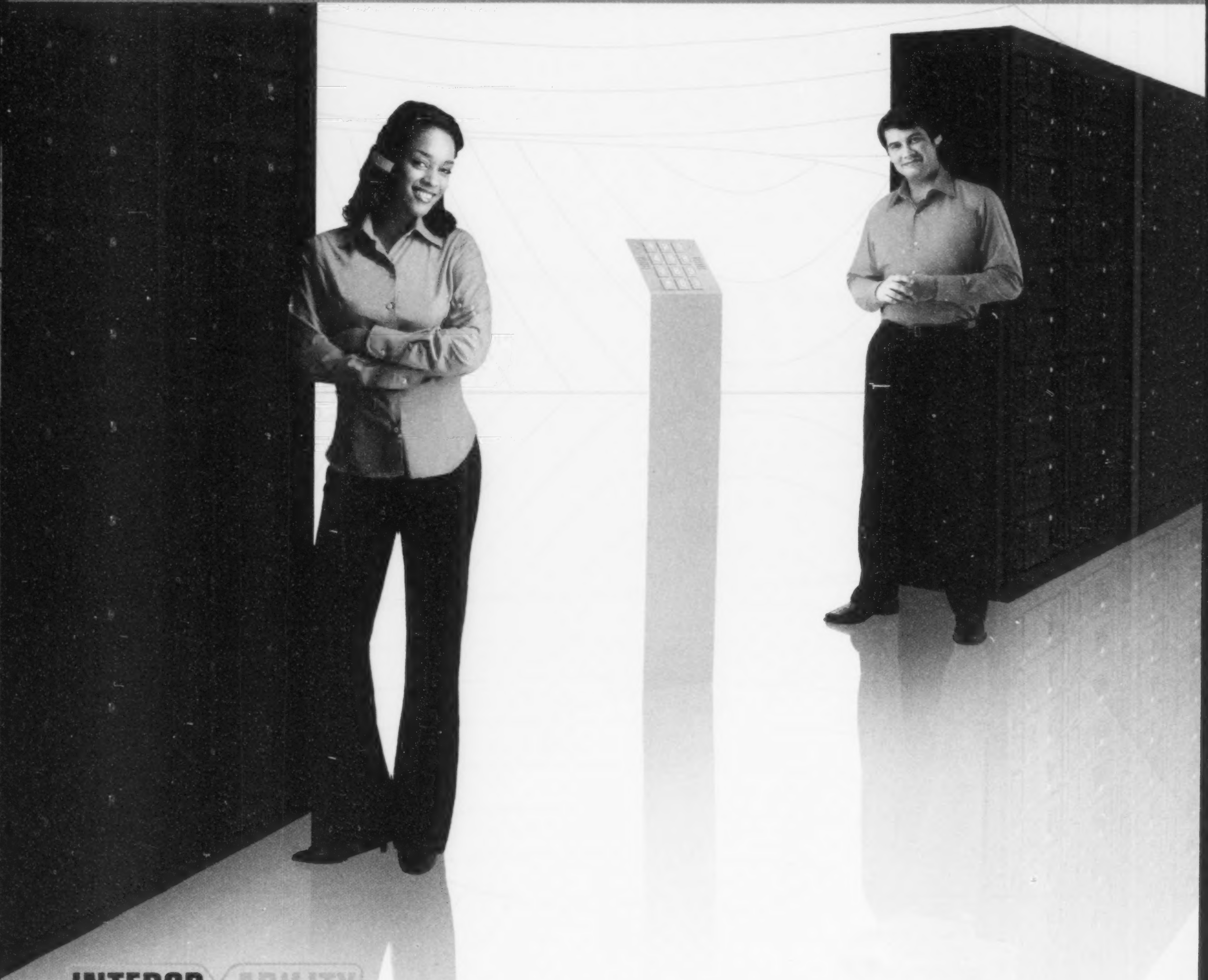

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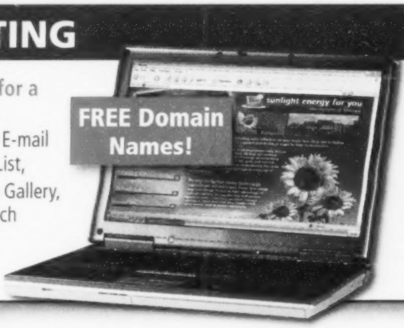

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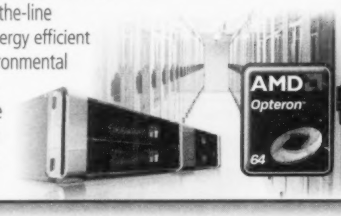

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"Basically we are reconnecting the brain to the muscles so people can control their paralyzed limb just by thinking about doing so.

Continued from page 14

ward. Now that computer capacity has greatly expanded, we have the ability to digitize and process many individual neural signals simultaneously and apply more sophisticated mathematical decoding algorithms to those signals.

What are you doing at the FES Center? The goal at the center is to restore movement and function to people with paralysis from spinal cord injury, stroke or other neurological disorders. Movement is restored by applying low levels of electrical current to the peripheral nerves to activate paralyzed muscles. My particular role is to decode one's intended arm and hand movements from the brain. Basically, we are reconnecting the brain to the muscles so people can control their paralyzed limb just by thinking about doing so. Intended movements can also be used to control other technologies, such as prosthetic limbs, assistive robots or a computer mouse.

What needs to be done to really advance the state of the art? Everyone is making small, incremental improvements in algorithms. But we need to be able to acquire the brain signals in a way that doesn't take a whole laboratory of technicians, so that this technology can be used in the real world.

How do you acquire these signals, and what's difficult about it? The least invasive method is with external surface EEGs, where sensors are stuck to the scalp with conductive paste. EEGs provide the lowest-resolution picture of what is going on in the brain because the brain signals get blurred as they pass through the skull and scalp. However, the video game industry is pushing the development of "dry" sensors embedded in headbands that anyone can easily slip on. Their reliability has not been proven yet, but at least that technology is moving forward.

Sensors can also be implanted under the scalp, embedded in the skull or placed on top of the brain. To detect the activity of individual neurons, you need to use very tiny electrodes inserted a few millimeters into the brain.

We'd like to be able to record the same neurons for decades, so the brain can learn how to fire those neurons to control a device. But if these tiny sensors move even a little bit, they pick up different cells. Then the brain has to relearn how to make these new neurons fire in order to control the same device.

What's an example of something that's been commercialized? We developed at FES a hand-grasp system for people with spinal cord injuries who can't move their hands. That was commercialized and is now in use by several hundred people worldwide.

Where will your research lead over five to 10 years? With all the advancements in technology miniaturization and wireless communication, we should be able to eventually shrink the racks of equipment we use in the lab and make all the processors small enough to carry around on a wheelchair or even small enough to implant in the body. That's a little less glamorous than what draws people into the field, which is, "Oh, I get to read brain signals. That's a cool, fun challenge." But the practical aspects of taking the technology out of the lab and into the real world — that's where the needs are.

You've talked about the movement of signals from the brain to a computer. How about signals that move the other way, into the brain? With a spinal cord injury, you lose your ability to control your muscles, but you also may lose the sensation of touch and of where your limbs are in space. Other injuries or diseases can cause blindness, deafness or other sensory losses. Instead of simply recording from the brain, we can also use electrode technologies to stimulate the brain and bypass the breaks in the neural pathways that bring sensory information in.

For example, there are a number of places where you can tap into the visual pathway. Where you stimulate depends on where the damage is.

One stimulation system uses 96 little prongs in a 4-by-4 millimeter space in the cortex, and these prongs send out electrical currents that activate the nearby neurons. Even if the eyes are damaged, the artificially stimulated neurons can still fire in the same way that they would have fired if a photon of light had hit a healthy retina. This type of system would work by taking an image from a camera you'd wear on your glasses and processing that image into the electrical stimulation instructions needed to produce that image in the brain.

What are some nonmedical applications of brain-computer interfaces? These are the questions we try to avoid. Our colleagues can give an hourlong interview, and the little bit they say about the lie detector is the quote that gets published. But if you are looking to download the dictionary into your brain, or read your e-mail directly into your head, that's not going to happen anytime soon.

— *Interview by* **Gary Anthes,**
a former Computerworld
national correspondent

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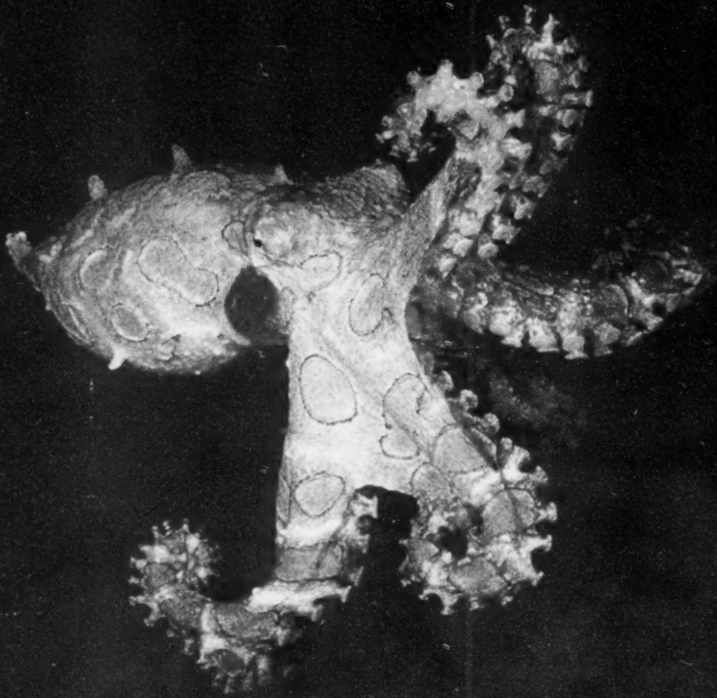

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The answer is obvious,

Are Computers TRANSFORMING Humanity?

IMAGINE A WORLD where your phone is smart enough to order and pay for your morning coffee. No more giving orders, handing over your payment or waiting in lines. No more face-to-face chitchat or human interaction.

For many, this might seem like a blessing. Who likes to wait in line? But on a grand scale, might this kind of automated world dramatically change — perhaps even eliminate — how we communicate and connect with one another? Could it change something about us as individuals, or as a whole society?

BY MARY K. PRATT

"My short answer is yes. It's absolutely changing society and the way people are," says Melissa Cefkin, an ethnographer at IBM. "But there's nothing new in that. We've always had the introduction of new technologies that transform and move society in new ways. It changes our interactions, our sense of the world and each other."

But if primitive hand tools changed us from gatherers to hunters, and the invention of the printing press propagated literacy while downgrading the importance of the oral tradition, what individual and cultural transformations do new computer technologies portend?

Researchers and technologists alike say they're already seeing technology-wrought changes in how we operate as individuals and as a society. To be clear, they're not finding evidence of evolutionary transformations — those show up over thousands of years, not merely decades. But there have been shifts in individual and societal capabilities, habits and values. And just how these all will play out remains to be seen.

"We're in a big social experiment. Where it ends up, I don't know," says Dan Siewiorek, a professor of com-

Continued on page 24

the implications profound.

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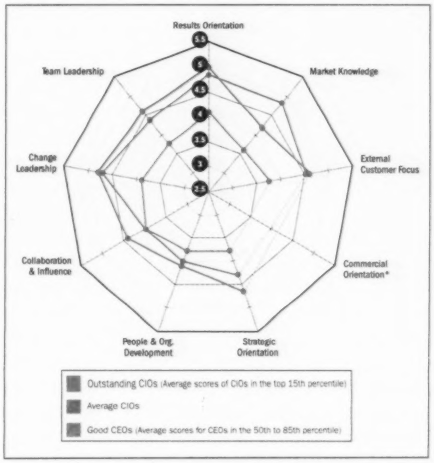

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Keeping PACE At Work

WHEN MOST PEOPLE see a billboard, they see an advertisement. David Zanca sees the future.

Zanca envisions the ad enabling a transaction right then and there. Pass a poster hawking golf clubs, just wave your smartphone, and you're done. Your computer will order, pay and arrange for shipping in mere seconds.

"It will happen in the future. I don't know when, but we will get to that point," says Zanca, senior vice president for e-commerce technology at FedEx Corporate Services in Collierville, Tenn. "People's expectations continue to evolve, and they want quick answers, fast transactions."

IT leaders must delve deeper than most into evolving technologies. They must also consider how those technologies are changing us as individuals and as a society. Today, that means managing workers and customers who demand constant connections, mobility and flexibility; who often prefer electronic networking over in-person contact; and who multitask with ease but may not have the same thinking processes as previous generations.

"I've had to change the way I think about what work means, because technology is changing us. Everything has to be instantaneous, and convenience is a big factor," says Christopher R. Barber, senior vice president and CIO at Western Corporate Federal Credit Union.

He sees younger workers used to online connections and activities expecting the same type of environment at work. They seek information and professional connections electronically and instantaneously – often

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Continued from page 21

puter science and electrical and computer engineering and director of the Human-Computer Interaction Institute at Carnegie Mellon University.

Like other researchers, Siewiorek has identified a number of areas in which individuals and societies have changed in response to technology during the past two decades. One of the most obvious, he says, is the shift in how we view privacy. Having grown up in the McCarthy era, Siewiorek remembers how guarded people were with their phone conversations, fearful that they would be overheard or, worse, recorded.

"Now you can sit in any airport and hear all the grisly details about a divorce or something like that. I don't know if the convenience overrides privacy or people don't care about the other people around them, but certainly what we let hang out there has changed," he says.

Any doubts? Just look at the deeply personal details that people post on YouTube, MySpace and Facebook.

At the same time, people have used this willingness to share via technology to forge new definitions of community. "There are certainly different versions of community emerging, and that's facilitated by innovative uses of technology," says Jennifer Earl, associate professor of sociology and director of the Center for Information Technology and Society at the University of California, Santa Barbara.

A hundred years ago, neighbors would come together for a barn raising, willing to put in hard labor because they might need similar help someday. Today, Earl says, technology — whether it's Twitter or e-mails or a viral video appeal — can spur people across the world to the same type of communal action, even if they have no personal connection to the individuals helped or the tasks involved.

"Today, with technology, we can enable people to act collectively across boundaries. And one of the things that is different today isn't that we can just act collectively very quickly, but we act across heterogeneous groups," Earl says.

She points to the collective actions taken to help the victims of Hurricane Katrina as an example. Citizens throughout the U.S. posted their spare items, from clothes to extra rooms, that displaced Louisiana residents could then use in their time of need.

> **"The one who has the advantage is the one best integrated with the technology.**
>
> **BRAD ALLENBY,** PROFESSOR OF CIVIL, ENVIRONMENTAL AND SUSTAINABLE ENGINEERING, ARIZONA STATE UNIVERSITY

And it doesn't take an emergency for new and different types of communities to emerge. "Technology changes the whole idea of who we belong with," says anthropologist Ken Anderson, a senior researcher at Intel Corp.

In the past, community members had some sense of a shared history and shared goals and objectives. Today, an online community can have more specific, tailored interests than would likely be found in a physical neighborhood or town, whether it's a rare disease, a passion for running or an interest in a celebrity.

NEW LANGUAGE, NEW VALUES

Our ability to reach across time and space and build connections via technology with anyone, anywhere and at any time is changing more than our sense of community; it's changing how we communicate, too.

"There is a new language being produced, although it's not replacing our existing language," says anthropologist Patricia Sachs Chess, founder and president of Social Solutions Inc., a consulting firm in Tempe, Ariz.

Chess and others point to the use of slang and jargon (both pre-existing and newly developed for today's instant communication tools), phonics, abbreviations and colloquial syntax as the evolving standards for electronic discourse.

And this new vernacular is spilling over into traditional writing and oral exchanges. "The first thing that comes to mind is the term *bandwidth*," Chess says. "It is a technology term and has become incorporated in the language in ways such as, 'Do you have enough bandwidth to take on that project?' There's also 'I'll IM you' and 'Just text me.' "

While we aren't seeing those yet in formal writing, she says, they are common in casual writing such as e-mails

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Keeping PACE At Work

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A customer attending the Masters Golf Tournament and shopping for Masters merchandise, for example, will expect to wave his smartphone over a bar code to buy the products, fill out the shipping information and pay shipping costs, says Zanca.

"I do think we're rapidly evolving to a society that depends on things like PDAs. And when they break down or you don't get a signal, it's almost like you become completely ineffective," says Gregory S. Smith, vice president and CIO at World Wildlife Fund.

Smith says he recently spent three days in Tokyo, where his smartphone didn't work. He says he found the lack of cell and data connections "very disturbing," although he was able to find alternatives.

But despite that experience, Smith says he must set limits on what his IT department can support. "The consumer technology market is influencing the corporate IT space, and it's doing so with more and more requests for near-instantaneous support for every product that comes out," he says.

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DIGITAL NARCISSISM

Others voice deeper concerns about this evolving digital community.

Go back to that example of the smartphone ordering and paying for your morning coffee. Yes, it might eliminate waiting in long lines, but ultimately it could also affect our capacity to interact meaningfully with one another. Evan Selinger, an assistant professor in the philosophy department at the Rochester Institute of Technology, explains (ironically enough) via e-mail: "The problems posed by automation are not new, and that scenario would not present any distinctive problems, were it an isolated convenience. However, the scenario does pose a deep moral challenge because it can be understood as part of a growing trend in digital narcissism."

Digital narcissism, Selinger explains, "is a term that some use to describe the self-indulgent practices that typify all-too-much user behavior on blogs and social networking sites. People often use these mediums as tools to tune out much of the external world, while reinforcing and further rationalizing overblown esteem for their own mundane opinions, tastes and lifestyle choices."

Others point out that technology isn't just changing our connections and how we communicate with one another. It's also affecting our cognitive skills and abilities — even what it means to be intelligent.

Researchers say the constant stimulation and ongoing demands created by technology, as we jump from texting to videoconferences to a phone call to listening to our MP3 players, seem to affect how we organize our thoughts.

Christopher R. Barber, senior vice president and CIO at Western Corporate Federal Credit Union in San Dimas, Calif., says he has noticed that some of his workers, notably the younger ones, are skilled at multitasking using various technologies. "And the results show that the work is getting done, and it's getting done well," he says.

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“I don’t see the deep thinking. I see superficial connecting of dots rather than logical thinking,” Siewiorek says. “I see people who are not going to the source anymore. They just forward things. There’s no in-depth research going on. It seems that people have lost history. [They don’t ask] ‘Where did these things come from? Who said it first?’ ”

BRAIN CHANGES

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But some question whether we even need the same thinking skills as we had in the past. After all, why should we memorize facts and figures when search engines, databases and increasingly powerful handheld computing devices make them instantly available?

Years ago, intelligence was measured in part by memory capacity, says Brad Allenby, a professor of civil, environmental and sustainable engineering at Arizona State University who studies emerging technologies and transhumanism. “Now Google makes memory a network function,” he says. “Does that make memory an obsolete brain function? No, but it changes it. But how it will be changed isn’t clear. We won’t know what will happen until it happens.”

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“Once we get seriously into [augmented cognition] and virtual reality, the one who has the advantage isn’t the one who is brilliant but the one who can sit in front of the computer screen and respond best,” he says. “The one who will be best is the one best integrated with the technology.”

For society, the computer is just the latest in a string of new technologies requiring adaptation, anthropologists say. In the past, we’ve embraced other technologies, including farming tools and the printing press, and we’ve managed to remain human, even if some of our skills and values have evolved.

For example, Cefkin says she used to pride herself on how many phone numbers she could remember. “Now I can’t even remember my own,” she says. “We can all point to things we used to do that we can no longer do because of technology, but we don’t talk about the things we now have. I remember where computer files are today. That’s not a different realm of memory or experience” than memorizing telephone numbers.

Besides, Cefkin adds, society often finds ways to fix the glitches that technologies introduce. Too many phone numbers to memorize? Cell phones with memory, or a smart card containing your important data, can replace a brain full of memorized numbers — and do much more to boot, she adds.

In the end, Cefkin and others point out, it’s still humans who are in control of the technology and will determine whether the “advancements” technology enables will make a positive or negative impact on our world.

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Keeping PACE At Work

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And people are putting their new tools to good use. “I look at people who are joining the workforce and they want fast answers, but they’re very creative and they’re very hardworking. They just have a different style,” Zanca says.

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DEVELOPING CLINICAL DASHBOARDS

These eight steps helped the University of Pennsylvania Health System successfully complete six projects. **By Brian Wells**

HOSPITALS, MEDICAL CENTERS and other health systems are increasingly using digital dashboard technology to provide relevant, up-to-the-minute information to clinicians in a visually rich format to improve the quality of patient care.

Designing and using clinical dashboards requires substantial physician involvement and a well-defined process. The University of Pennsylvania Health System, a.k.a. Penn Medicine, is currently in the midst of developing the Penn Data Store, a data warehouse and series of individual dashboards, to serve our clinicians and researchers. The Penn story may be of use to you and your organization as you move forward in the world of dashboards.

Our goal was to create a single data storehouse with all patient, administrative, financial and supply chain data mapped to a standard data model and vocabulary. We created a number of objectives in support of this goal in areas such as patient-care quality, safety, compliance, research and finance.

After evaluating a number of choices, we decided to develop our dashboard using the enterprise edition of Oracle Corp.'s Business Intelligence Suite. While not all users' needs will be met with predefined dashboards, a significant portion will. We assembled a wide-ranging team and divided each dashboard project into the following phases:

1. **Meet with users to determine major data needs**
2. **Design the presentation layer** (how the dashboards look and behave)
3. **Design the semantic layer** (how the physical data is mapped to the dashboards)
4. **Design the physical layer** (how the data is pulled from the data warehouse)
5. **Develop and test all three layers**
6. **Perform quality assurance**
7. **Conduct pilot tests**
8. **Begin general rollout**

1

MEET WITH USERS TO DETERMINE MAJOR DATA NEEDS

Many users and potential users of dashboards aren't familiar with the systems' power and capabilities. They typically use noninteractive spreadsheets and graphs that present data in fixed rows and columns and lack the flexibility of Web-based tools.

The first step in this phase was to inform clinicians of the many additional possibilities that a more powerful tool offers. We did this by first building sample dashboards to demonstrate the tool's capabilities. We then asked the clinicians to identify several key measures, dimensions and filtering criteria for the dashboards they were interested in. For example, a key measure on our sample Medication Administration dashboard was whether the patient's medication list was reviewed with the patient during a visit. One user said he would be interested in seeing that dashboard display monthly and annual statistics, such as percentage of patient visits during which medication lists were reviewed, both for individual physicians and group practices as a whole. After gathering such input from users, we identified the source data and actions necessary for responding to each request and configured the physical layer accordingly.

Next we demonstrated the graphical capabilities of the tool to our clinicians in order to help expand their thinking about how they could use the dashboards. One user wanted to make it possible for physicians and group practices to compare their performances on certain measures against those of their peers. The ability to summarize and access actual patient visit details was important for doing that. From a security perspective, however, patient names couldn't be displayed and physician names could be shown only to members

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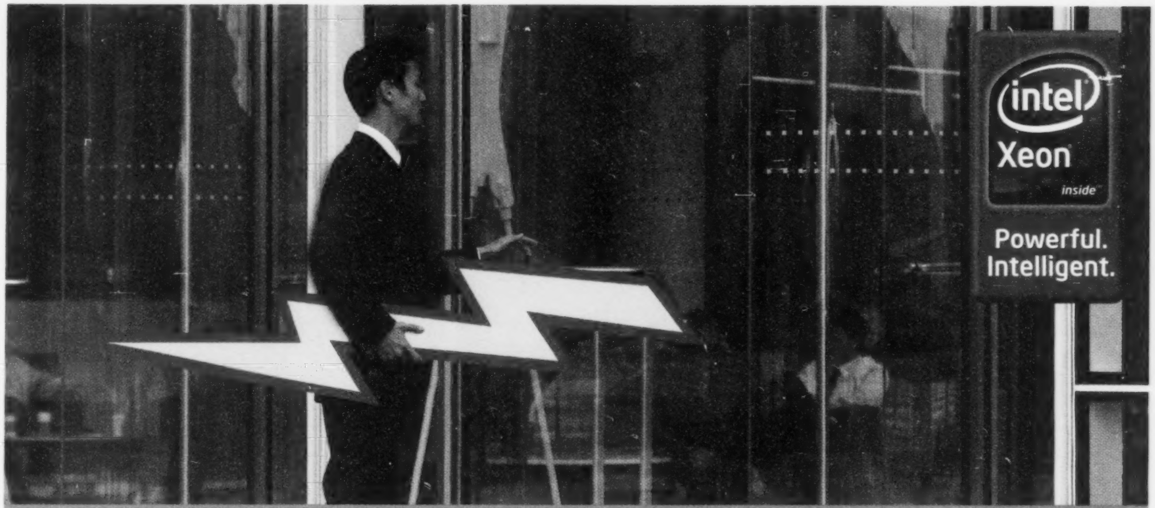

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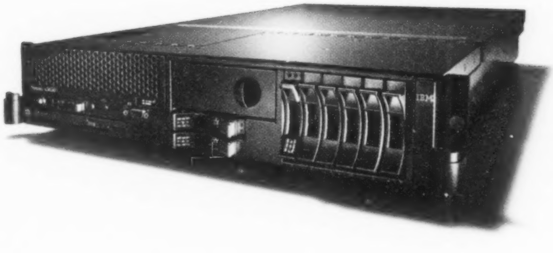

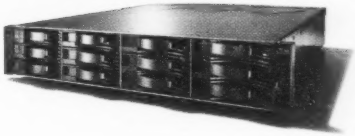

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of the same group practice. The user decided to use bar charts and organized the dashboard into pages that showed annual and monthly statistics by group practice and other metrics. Users could learn more by clicking on the bars in the charts or by clicking on a physician's name if they were in the same practice.

2 DESIGN THE PRESENTATION LAYER

For dashboards to deliver the most benefit, users must agree on presentation standards before the design phase begins. It's crucial to achieve agreement on items such as color schemes, graphical objects and navigation standards so future dashboards will look, feel and behave consistently. This will improve user satisfaction and reduce training demands for each new dashboard.

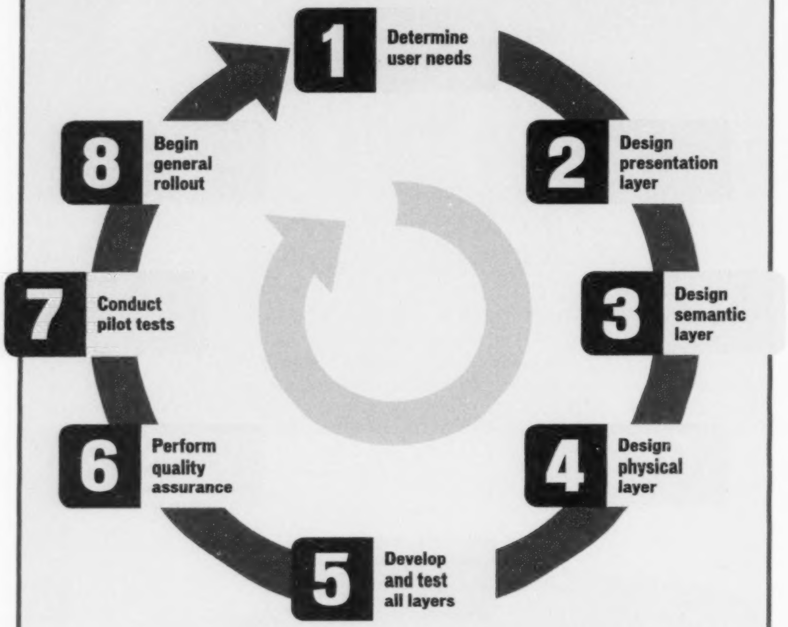
Designers must think carefully about the hierarchy of the data they want depicted in the dashboards and what levels of the hierarchy will be visible. In our example, the hierarchy is Practice – Physician – Patient. Depending on a user's security status, he may or may not be able to see the patient data.

Once the hierarchy and associated measures such as year, month and practice name were grouped into a dashboard page, we selected the graphical elements. We chose histograms, line graphs, pie charts and simple tables to present the data in an intuitive fashion that met users' needs and simplified navigation through the dashboard pages.

We also developed online documentation for each dashboard and for each page of each dashboard. The overview information for each dashboard is presented as the first page. Additional comments about a specific page of the dashboard are included on the appropriate dashboard page.

That makes it easy for viewers to understand the aggregate data behind the dashboard pages as well as any data limitations and assumptions before seeing the particular data they're interested in. This helps avoid confusion or misinterpretation of the results.

PENN MEDICINE CLINICAL DASHBOARD DEVELOPMENT LIFE CYCLE



I'VE DEPICTED THE PROCESS AS A CIRCLE because dashboard development is a continual process. It is useful, however, to sometimes pretend otherwise and seek to limit the scope for each trip around the circle (a release). Doing so helps generate a sense of closure and accomplishment for both users and the development team (in addition to actually producing a deliverable).

– BRIAN WELLS

3 DESIGN THE SEMANTIC LAYER

The semantic layer maps the presentation layer to the physical layer. Developers prove their worth in the design of this layer. Defining patient populations by disease categories, grouping drugs hierarchically by therapeutic area and organizing physical locations are examples of the challenges that the semantic layer's designer faces. Users play a key role in formulating those definitions. In-depth knowledge of both the presentation layer design and the physical data models is essential.

4 DESIGN THE PHYSICAL LAYER

As mentioned, try not to change the design of the physical layer. Whenever possible, avoid creating an entire new physical data structure, because doing so generates the need for additional extract, transform and load (ETL) steps each time the clinical data warehouse is updated. Redundantly storing data produces additional storage, backup and maintenance costs and opens up the risk that duplicate copies of data won't be updated with the same frequency as the original.

If the designer and data architect

determine that redundant structures are required, however, the designer should clearly document that need and ensure that the online documentation in the presentation layer reflects the redundant sources. The ETL developer will also need specifications for creating and maintaining these redundant sources.

Finally, using realistic data volumes, simulate dashboard performance during this phase by executing typical data queries for each page, drill-down and filter selection.

5 DEVELOP AND TEST ALL THREE LAYERS

Users who are new to the dashboard development process will likely need to see how the systems operate with real data. We have found it useful to introduce clinicians to a working prototype to gain early feedback on the design. Regular weekly demo and review sessions then help developers refine and test the design. When you're engaged in this phase of the project, take care to manage scope creep, since participants might be tempted to request new capabilities or data that weren't in the original design. Put off responding to such requests until a subsequent release of the dashboard.

6 PERFORM QUALITY ASSURANCE

Here are several quality-assurance requirements we developed at Penn Medicine:

- Use data from the actual data warehouse, rather than simulated or test data.
- Include monthly and quarterly data warehouse updates during the QA process, especially when the data being used in dashboards will cross calendar months, quarters and years. A year-end data update would be ideal, but most projects can't wait that long.
- Compare dashboard data to the original source systems, to ensure that no translation or presentation errors were introduced during development.
- Test system performance and response times with large amounts of data to ensure that the dashboard responds effectively to users' needs.

7 CONDUCT PILOT TESTS

Before making a dashboard available, we ask a small group of users to pilot-test it for a few weeks, as a short extension of the QA phase. This provides additional information on usability, performance and quality. If the pilot group recommends moving forward, we proceed to the general rollout. If the pilot group identifies problems, the development team resolves them.

8 BEGIN GENERAL ROLLOUT

This phase involves these major components:

- **User orientation:** New users may need a brief training session. Those who have used dashboards in the past should be able to use the new dashboard with no assistance — if the presentation layer was designed well.
- **Support documentation:** Gather design and operational specifications and post them on support sites.
- **Help-desk hand-off**: Write scripts and give them to the help desk for guidance in responding to support calls.

To date, we've created clinical dashboards on these six subjects at Penn Medicine:

1. **Managing acute myocardial infarction**
2. **Reconciling ambulatory medications**
3. **Evaluating the effectiveness of computerized physician order entry alerts**
4. **Managing diabetes**
5. **Performing cardiovascular surgery**
6. **Treating breast cancer**

This approach has met our needs. Our next focus will be on evaluating the contribution that dashboards make to our patient-care quality, safety and compliance goals. ■

Wells *is chief technology officer for information services at the University of Pennsylvania Health System. Contact him at Brian.Wells@uphs.upenn.edu.*

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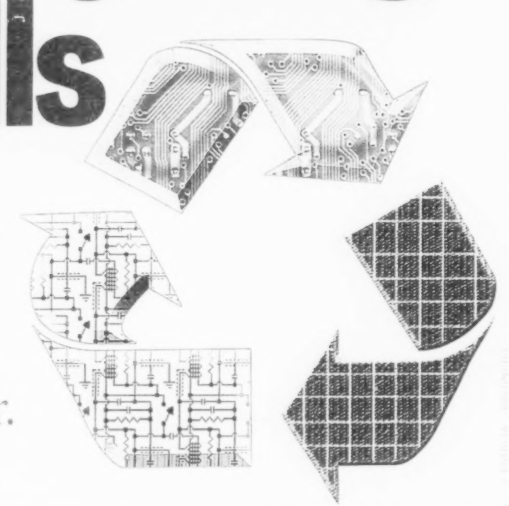
IT Recycling Pitfalls



A few simple steps can keep an IT green policy from turning into your own ecological disaster.

By John Edwards

WENDY BURCHARD, procurement coordinator in the IS department at the University of Richmond in Virginia, knows all about the pitfalls of recycling old equipment.

Burchard discovered that the firm that was carting away the school's unwanted computer hardware for recycling was actually reselling the equipment. "We thought everything was getting crushed up into little pieces. Then we found out later that they were reselling our stuff," Burchard says. "They never told us they were doing that."

Like most IT professionals these days, Burchard was simply trying to help her shop follow environmental best practices. "We would never want to do anything to hurt the environment," she says. "We want to always do the right thing."

In recent years, recycling has become a high priority for IT departments. Yet as recycling efforts are ramping up, more managers are finding themselves coping with shady recyclers that dispose of IT assets in environmentally irresponsible ways, potentially exposing sensitive enterprise data in the process.

Burchard's brush with an unscrupulous recycler put her job on the line. "The last thing that we want is to have somebody find a University of Richmond computer over in China somewhere," Burchard says.

AVOIDING LANDFILLS

Christine Pfendt, CEO of Citigate Cunningham, feels Burchard's pain. When she joined the public relations firm several years ago, Pfendt didn't anticipate acquiring a recycling headache. But that's what she got when she inherited 5,000 square feet of obsolete computer equipment and peripherals. The previous management team had taken a novel approach to equipment disposal, she says. "Instead of recycling or repairing, they'd just buy new equipment" and cast aside the old.

A staunch environmentalist, Pfendt wanted to find ways to use everything to its end of life, avoid waste and keep the items from adding to landfills.

Cutting through the clutter proved to be an arduous task. "We had to figure out what was usable and what was not," she says. Staff members separated items that contained sensitive information from those that didn't. "For cell phones and pagers without confidential info, we gave them to a battered women's shelter," Pfendt says. "For the servers, we created a script that wiped away the info." The machines could then be safely recycled.

Unneeded monitors, however, were advertised on Craigslist. "The person who came for them told us they were a nonprofit," Pfendt recalls. But she later learned it was a for-profit company that was reselling the monitors — on Craigslist. Lesson learned: "Require a copy of

Five Steps to Surprise-free Recycling

1. Research the provider. **Find out everything you can about the company. Search the Web for reports and reviews. Ask colleagues what they think about the firm. Get references, and speak with current and past customers.**

2. Check qualifications. **Check to see if the business has achieved ISO 9001:2008 or ISO 14001:2004 certification.**

3. Get everything in writing. **Don't assume that the recycler is disposing of your assets properly. Get the company to state in writing how it's handling each consignment. Work with your finance department to ensure that assets being disposed of are being recorded accurately.**

4. Get input. **Consult with key departments, such as procurement and legal, to verify that equipment is ready and safe to be recycled.**

5. Monitor the situation. **Visit – or hire someone to visit – the recycler's site to view processes and talk to employees.**

– JOHN EDWARDS

their 501(c)(3) status in advance," she says.

Mathew Jancsis, an IT services engineer at Vertex Pharmaceuticals Inc. in Cambridge, Mass., doesn't have any recycling horror stories to tell, because he did his homework before signing up with a recycler.

Jancsis recommends sticking with local businesses that specialize in technology equipment recycling, particularly those that have achieved ISO 9001:2008 and ISO 14001:2004 certifications for quality and environmental management. "Tour the facility, if possible, and examine their processes," he says.

Get detailed documentation about equipment that was recycled and specifics about what was done with it post-processing. "Also, if possible, go to the facility when your data-sensitive equipment is scheduled for destruction to verify first-hand that this takes place according to the processes agreed upon," Jancsis says.

WORTH THE PRICE

All of that takes time and money, which are scarce resources these days, Jancsis acknowledges, but it's worth it. "While saving money is critical, the price a company would pay in working with a less-than-reputable establishment far outweighs the upfront cost of working with an honest firm," he says.

Kelley Keogh, president of Sin Fronteras EHS Consulting, a Santa Rosa, Calif.-based company that helps businesses create and follow environmental, health and safety policies, says IT managers need to be aware of two things when dealing with recyclers. "One is whether the companies are sending the materials to managed facilities that [follow] U.S. specifications," she says. "The other is whether they're exporting materials legally to the countries that are receiving them."

> **"The last thing that we want is to have somebody find a University of Richmond computer over in China.**
>
> **WENDY BURCHARD,**
> IS DEPARTMENT PROCUREMENT COORDINATOR, UNIVERSITY OF RICHMOND

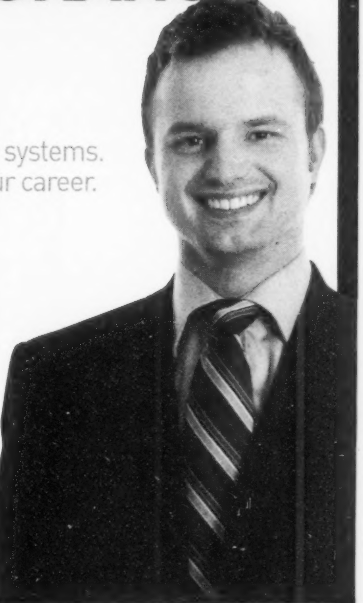
Failing to perform due diligence in both areas can lead to serious consequences. "That's the kind of stuff that comes back to bite you," Keogh says. "A recycler comes in and says, 'I'll do a great job for you,' and then someone finds your material in some little dump in some tiny town in China."

At that point, the world suddenly becomes a whole lot smaller. "They can trace it back to your company," she says, "and because you took the [recycling] company's word, you end up being liable for not only looking horrible, but for being horrible."

On the bright side, an enterprise that has suffered a financial loss because its data was compromised by a shady recycler might be able to recoup some or all of its losses through a lawsuit, says Josh King, general counsel at Avvo Inc., a lawyer search service in Seattle.

But financial compensation can't undo the loss of customer trust. That's why you need be to be highly cautious when recycling IT assets that contain sensitive data. Says King, "You can't just hire vendors and wash your hands of it." ■

Edwards *is a freelance writer in Gilbert, Ariz. You can contact him at jedwards@gojohnedwards.com.*



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PC Energy Use Still Unmanaged

Most companies lack PC power management programs, which means they're wasting energy and money. **By Patrick Thibodeau**

MOST IT shops aren't managing PC power use within their organizations, which means they're passing up big savings, especially in regions with high energy costs.

In a recent Forrester Research Inc. study of PC power management practices at large and midsize companies, only 13% of 91 IT managers polled said that they had implemented wide-scale power management programs, while another 18% said they had set up programs but not for all of their PCs.

The top reason cited for the low deployment rate was the fact that IT managers aren't responsible for technology energy costs, says Forrester analyst Doug Washburn (see chart).

TOP 5 BARRIERS

IT managers cite the following obstacles to implementing PC power management:

1. No IT department ownership of energy costs
2. Users won't tolerate any loss of productivity from PC power management
3. Not sure which approach to take or policies to adopt
4. Unable to determine the amount of financial savings
5. Unable to perform PC management tasks (e.g., updates, patches, backups) when PCs are in low-power state

SOURCE: FORRESTER RESEARCH INC., APRIL 2009
BASE: 83 RESPONDENTS

THE XP FACTOR

The survey results aren't surprising: The U.S. Environmental Protection Agency estimates that no more than 10% of all enterprise PCs in use have their power management capabilities turned on.

One reason for that may be skepticism about how much money can be saved per PC. Another may be the continued use of Windows XP. Windows Vista gives administrators the ability to natively manage power settings on PCs over a network, but XP does not. There are third-party tools available for that, however, including a free one from the EPA called EZ GPO.

In addition, managing electricity usage typically falls under the jurisdiction of facilities managers, such as Forrest Miller, director of support services for the Lake Washington School District in Redmond, Wash. Among other things, he's responsible for about 11,500 PCs' power utilization.

For the past several years, Miller has been using software from Seattle-based Verdiem Corp. to manage the school district's PC power consumption. The tool is set to put PCs into sleep mode after 20 minutes of inactivity, says Miller, whose IT department administers the software for him.

The Verdiem software costs Lake Washington $25,000 annually under a three-year agreement. Miller says that the application has helped the district reduce power consumption by about 3.66 million kilowatt-hours per year, for an annual savings of about $256,000, based on current electricity rates.

Miller says he views power management as an easy way for users to have a major impact on energy costs with minimal or no impact on work processes. He adds that he has yet to hear any complaints from employees about the program. "It would be interesting to me to know why people wouldn't do this," he says of PC power management in general.

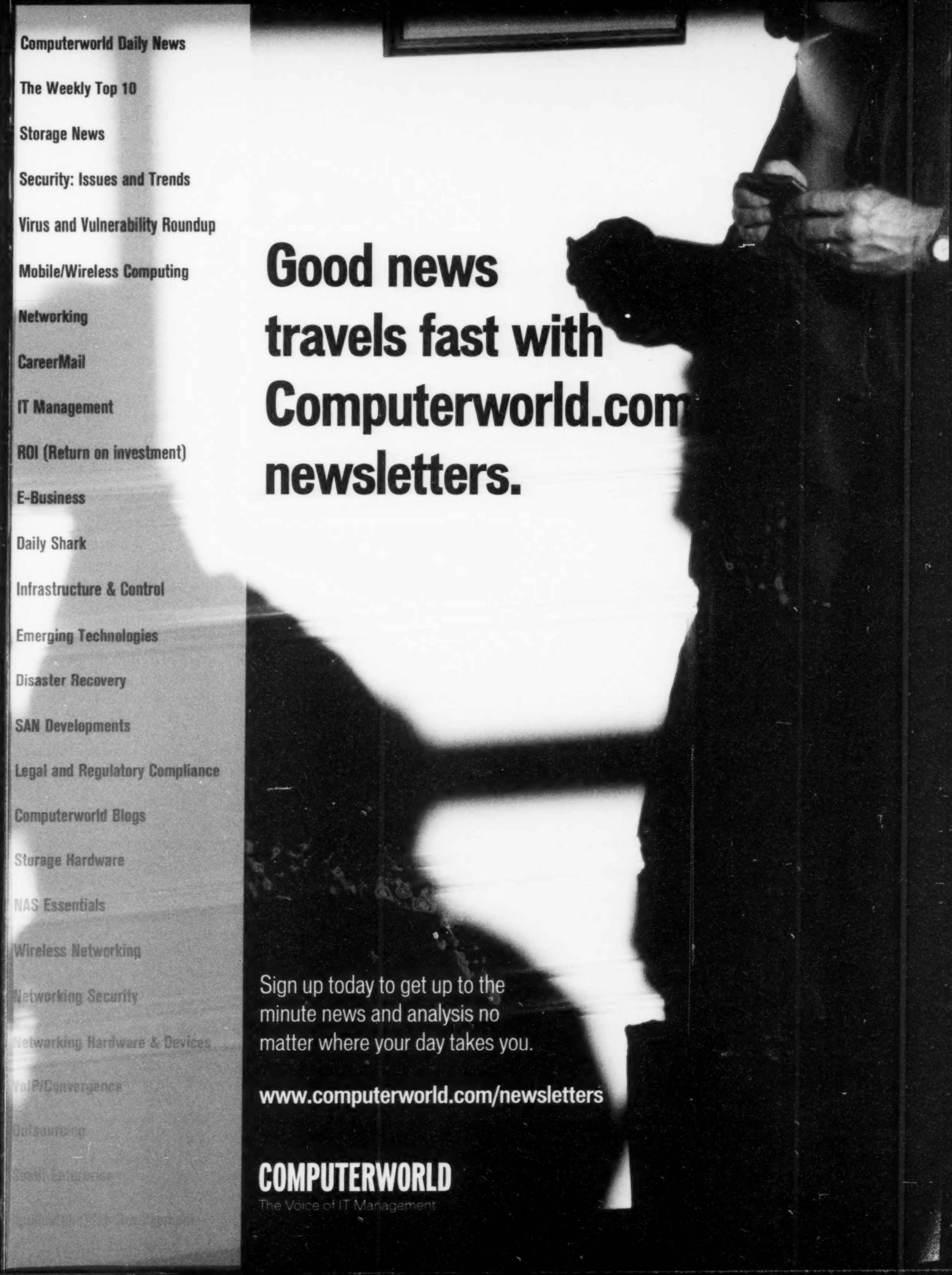
DOLLAR SAVINGS VARY

The amount of money saved might vary significantly by region, though. For instance, Washington state has relatively low power costs, in the range of 5 to 7 cents per kWh. Contrast that with states in the Northeast, such as Connecticut, where rates range from 14.25 cents to nearly 20 cents per kWh, according to the U.S. Energy Information Administration.

The EPA estimates cost savings of $25 to $75 per PC annually if system standby or hibernation features are activated on machines.

Washburn says there are other reasons why PC power management tools aren't being deployed more widely. There are concerns about possible end-user backlash, uncertainties about the best approach and policies to put in place, and an inability to predict financial savings.

But only 9% of the IT managers surveyed by Forrester said they had no interest at all in PC power management, while 48% said they were considering the idea of setting up a program. Washburn says he thinks change is afoot. Even if IT managers don't own the energy budget at their companies, he says, "there is much more pressure to understand energy consumption." ■



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SECURITY MANAGER'S JOURNAL | J.F. RICE

You Want to Put *What* on the Web?

The company has **fast-tracked** a project to make **payroll and accounting** accessible from a **front-end Web service.**

READERS WHO, like me, live and breathe security will cringe when they read this sentence: My company plans to build a front-end Web service for our payroll and accounting system.

Internal financial systems are the most sensitive part of most companies' networks. Putting them in the direct line of fire of the menaces on the Internet is more than just potentially dangerous. It could be catastrophic. We're talking about data regulated by things like Sarbanes-Oxley and SB 1386. For a security guy like me, it's unthinkable that we would do anything to make such data more, rather than less, breachable.

But you'll *really* cringe when you hear what the project team had in mind before I was consulted. Their original idea was to simply install a couple of Web servers in our Internet DMZ and open up communication directly between them and our financial systems. Yikes! And would you believe that the application vendor recommends this approach? This is why security managers have their work cut out for them.

Putting the kibosh on this project was out of the question. Given the financial climate, this is a fast-track, high-profile effort seen as a necessity to streamline our ability to gather records from our customers and send payment information back and forth. Even delaying it wasn't an option.

There's more. Each customer using the Web front end will need log-in credentials, and their accounts will need to be added somewhere. The first idea was to simply add them to our internal user directory. But we have over a million customers!

Fortunately, since being briefed on this project, I've been able to educate everyone about what's at stake, from the project team on up to the CIO. What's happened since is a good example of the compromises that most security managers have to live with.

■ Fortunately, I've been able to educate everyone about what's at stake.

THE MIDDLE GROUND

There's no way I could get the external parts of the accounting system separated from the rest of it, so a connection from the DMZ into our family jewels is unavoidable. But I have been able to get the team to re-architect the design so that more layers will be involved. The way it stands now, the front-end Web servers will talk to an interim application server instead of directly connecting to the core payroll application. That's basically the middle ground compared to the amount of separation I'd really like to see, but it is what the project can realistically accommodate.

Now we just have to figure out how to authenticate all those customers. We've nixed the idea of adding them to our internal directory. In that battle, I had plenty of support from our account management department, which didn't want the job of creating all those users. And in this case, our CIO was very understanding of the problems involved in mixing employees and nonemployees in the same user database. So we will be creating a new user directory exclusively for customers. There aren't many user directory products that can support 1 million-plus users, and very few of them are actively doing that in large companies today. We are evaluating some products that have large-scale capability, but the choices are limited.

Trouble Ticket

AT ISSUE: Payroll and accounting are going to be Web-accessible.

ACTION PLAN: This project can't be stopped, but it can be modified smartly.

We dodged a pretty big bullet in this project. In the rush to roll out customer automation, security was overlooked, and so was what's really good for the company, in my opinion. But reasoning prevailed, and we are on a much better path now. With ever more services being brought out to the Internet, the line between what's in the private space and what's published out to the world has become blurred. I think this means that the job of the security manager is only going to get harder over time. ■

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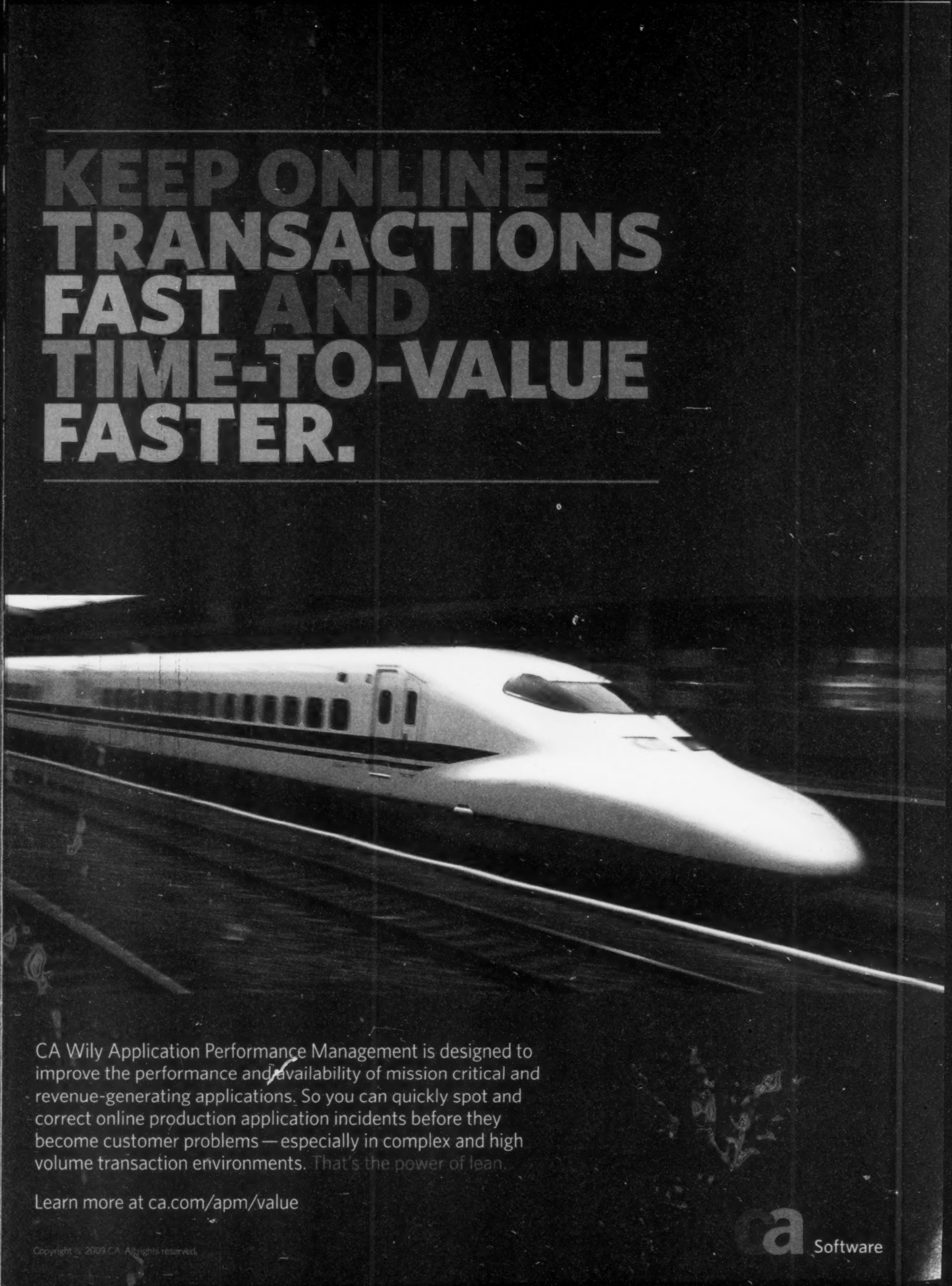
This week's journal is written by a real security manager, **"J.F. Rice,"** *whose name and employer have been disguised for obvious reasons. Contact him at jf.rice@engineer.com.*



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Vista ON Dell

The combination is secure, configurable, and a vital first step in Windows 7 migration

Businesses today expect more from IT than maintenance; they require competitive advantage in agility, security and scalability. IDC believes deployment is the time to seek those advantages, and a lower TCO. They are readily available, but require companies to standardize on a best-in-class platform like Vista, and to automate deployments as much as possible.

Bluntly put, there is no business case for deploying less-than-optimally secure equipment with a higher TCO. For IT decision makers in today's environment, a proven way to maximize security and minimize TCO is to purchase Windows Vista on Dell equipment for all new deployments—and then automate those deployments, all with an eye toward migrating easily to Windows 7 when the time comes.

WINDOWS VISTA ON DELL IS POWERFUL

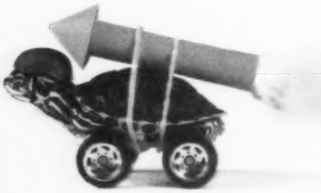
Windows Vista is more than an upgrade from Windows XP; it's a step-change to keep pace with the business environment. With advantages in mobility, security, collaboration and productivity, Windows Vista pays now while setting CIOs up for a smooth transition to Windows 7.

In terms of mobility, Vista's Mobility Center puts frequently-used notebook settings (like power management and sleep state) in a single place. Vista enables remote collaboration with Windows MeetingSpace, allowing up to 10 workers to collaborate securely over a wired or wireless network. And Vista offers best-in-class security, with an infection rate 60.5 percent less than XP SP2 systems; this is owing to security tools like BitLocker technology, which encrypts hard drives and enables "remote kill" capability. Finally, Vista offers Web 2.0-grade desktop search capability, finding files in seconds, versus minutes on XP.

Dell answers the demands for manageability and lower TCO with its Deployment Optimization Model (See sidebar). IDC research discovered that much of a computer's TCO occurs in the first week—up to $700 per machine—and that costs vary by degree of automation (see Figure 1). The largest cost, IT labor, can be reduced by 62 percent through automation, saving $418 per work station. Thus, hands-on deployments cost $678 per PC and take 2.6 IT labor hours, versus $260 and 36 hands-off minutes for fully-automated (or "dynamic") deployments.

WHY VISTA NOW?

Companies using Windows XP may be tempted to bypass Vista and go straight to Windows 7, but to do so is to defer competitive security, mobility and productivity. A two-step migration (XP to Vista to Windows 7) offers the immediate benefits of lower TCO; step-change advances in mobility and security; and a ready platform for Windows 7. It is a longer leap between XP and Windows 7; Vista applications will run on 7, but XP applications require more remediation. And companies can expect diminishing support for Windows XP, versus full automated support for Vista.



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VISTA ON DELL PCS AND NOTEBOOKS

IDC Research Services estimates that in 2010, notebooks will account for 48 percent of new deployments in workplaces, and desktop computers 52 percent. This has had a very positive effect on business computing overall; it has driven up security and configurability standards for all computers, which Vista and Dell's Deployment Optimization Model represent.

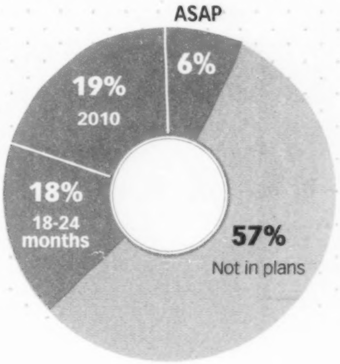
Notebooks are equal to desktops when it comes to price and processing power, but offer distinct advantages. Desktop users in small businesses believe they would gain 4.1 productivity hours per week using notebooks, but notebook users believe they gain 11.5 hours (see Figure 2). Thus "corridor warriors" benefit from the same utility as "road warriors."

Businesses like notebooks, but have high expectations from them. Wi-Fi coverage (61 percent) and security (60 percent) were the top concerns of the nearly 250 IT professionals responding to an October 2008 IDG survey. And businesses expect an 18 percent savings in TCO from using notebooks, through sheer standardization of, for example, licensing and compliance.

CXO QUICK POLL:

43% Plan Windows 7 Deployment within 24 Months

Q. **What are your Windows 7 Deployment plans?**



Asked of LinkedIn CIO Forum and CXO Peer Research panel March 6-18. 90 Respondents.

Vista improves upon XP with seamless, automated Wi-Fi connectivity. Again, Vista users can collaborate on a single file or application with MeetingSpace. Finally, Dell's automated deployment can reduce TCO by $418 in the first week, and virtually eliminate the $500-600 of IT labor per year per computer, according to IDC. Automation over a computer's lifecycle enables IT to focus on revenue-generating activities and business goals (like e-commerce and transaction processing) versus maintenance.

Finally, hard drive encryption, which Dell offers on several models, is critically important for mobile users, who may use the Wi-Fi hot spot in a Starbucks but be assured that enterprise data is secure.

CONCLUSION

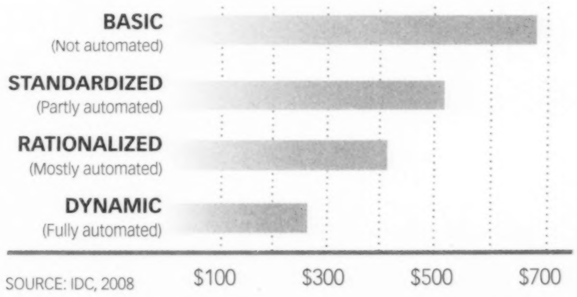
Very few companies—perhaps 5 percent—have achieved dynamic deployment according to IDC; a full 62 percent are at the basic level.

IDC believes that in an age of automation, a consistent software build can achieve maximum security, compliance and mobility with minimum TCO. This is only achievable with Windows Vista and automated deployment like that from Dell.

Finally, as mentioned, IDC believes there is no business case for deploying less-than-optimally secure equipment with a higher TCO. Choosing Windows Vista on Dell equipment for all new deployments, and automating those deployments, sets up the ideal migration to Windows 7.0. It's an effective way to optimize your client infrastructure and minimize TCO, two paramount goals in challenging economic times.

PC Deployment Costs on an Automation Continuum

(Cost of deployment per PC)



SOURCE: IDC, 2008

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OPINION

Preston Gralla

Desktop Linux: Why You Shouldn't Care

RECENTLY, the Web site analytics company Net Applications came out with figures that showed that in April, the percentage of "client devices" used to surf the Web that were running Linux crossed the 1% level for the first time ever — 1.02%, to be exact. The firm enthusiastically noted that "Linux has reached this important milestone on the client as Linux-based systems have become more functional, easier to use, and preinstalled on computers from vendors like Dell."

On the Web, you'd think manna had fallen from heaven. Linux backers touted the 1% breakthrough and prognosticated that Linux could eventually reach 20% market share.

My response: Not in this lifetime. And in any event, you simply shouldn't care about Linux on the desktop.

Let's start off with why Linux will never become an important desktop or notebook operating system. Linux has been around since 1991 — a full 18 years — and is available for free. Given that, the recent "milestone" of 1% market share doesn't seem so impressive.

In addition, if you do some digging in the Net Applications numbers, you'll see that from August to March, Linux use was largely flat. Last August, Linux's market share stood at 0.93% and then gradually declined before picking up again and reaching that 1.02% apex in April. So it's not as if Linux is on a skyrocket trajectory.

There's also some evidence that Linux market share won't likely ever get much higher than 1%, and certainly not more than 5%. The primary reason for the growth of Linux is the growing use of netbooks — inexpensive devices used primarily to surf the Web and send and receive e-mail. When netbooks were first sold, Linux was the desktop operating system on about 30% of them. Netbooks have been the fastest-growing segment of the PC market, which is why Linux finally broke the 1% barrier.

Will Linux reach 20% market share? Not in this lifetime.

But Linux isn't faring so well on netbooks these days. Analyst firm NPD Group found that, by the beginning of this year, only 10% of all netbooks sold had Linux on them, and that number is likely shrinking. And Windows 7 will run on netbooks — something that Vista doesn't do — which means that Linux market share will drop even further when Microsoft launches a big Windows 7 marketing campaign.

How about Linux on desktop or notebook PCs? If you hunt hard enough, you'll be able to buy some from Dell. But apart from that, good luck. You might as well go on a snipe hunt.

Desktop Linux will simply never be popular enough for most people to care about. One big reason is the difficulty of upgrading and installing software. It's true that using the operating system itself is simple and straightforward — much easier than it was in the days when you had to be a command-line junkie to get anything done with Linux.

But when you try to install new software, or upgrade existing software, you'll be in for trouble. I won't get down and dirty with the details here, but believe me, it's not pretty.

Beyond that, there is no single version of Linux, and so by definition, using it becomes a nonstandard experience. How many versions are there? I'm not sure anyone really knows. But these are just a few variants: Gentoo, Debian, Knoppix, Mandriva, SUSE, Red Hat, Xandros, Ubuntu, Slackware — and the list goes on.

The upshot? As a desktop operating system, Linux isn't important enough to think about. For servers, it's top-notch, but you likely won't use it on your desktop — even though it did finally manage to crack the 1% barrier after 18 years. ■

Preston Gralla *is a contributing editor for* Computerworld.com *and the author of more than 35 books, including* How the Internet Works *(Que, 2006).*

Career Watch

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LAID OFF, POORLY

Telonu.com – pronounced "tell on you" – another new workplace-rating site (Career Watch looked at Glassdoor.com on Feb. 23), has asked its growing membership to rate how companies are handling layoffs and other things related to doing business in this recession. Here are some of the results:

88%	of laid-off employees rated the handling of their layoff as poor or very poor.
94%	rated outplacement support as poor or very poor.
72%	rated severance packages and insurance as poor or very poor.
43%	of those laid off said they would work for their former employer again.
81%	of those still employed perceived job security as poor or very poor.
74%	of those still employed rated morale as poor or very poor.

SOURCE: TELONU INC. ONLINE SURVEY, MARCH 2009

PAGE COMPILED BY JAMIE ECKLE.

Q&A

David Noble

The author of **Gallery of Best Resumes** tells you how to create a résumé that will get noticed.

What are effective ways to make a résumé stand out? Ensure that you present the most important information about you just below your contact information. Susan Whitcomb, a professional résumé writer in Fresno, Calif., describes in her book *Résumé Magic* an imaginary rectangle, placed approximately 2⅝ inches from the top of the first page and running two inches deep. In this hot zone, you will want to put the most important information about you that will make you irresistible beyond any other candidate in the eyes of readers. If you discovered before Einstein that $E=mc^2$, you should put that kind of information here. That is an overstatement, of course, but spend some time determining the most important information about you as a future employee and then express that information in this key zone in an exciting, readable way.

Things to consider for this box include what you do best, your strongest IT strengths that set you apart from your peers or the most notable IT resources you bring to a company. There is no room for modesty here.

Explain achievement results in a way that nontechnical readers can understand. Strive for a balance between language that IT readers will expect and information that non-IT readers will appreciate.

If you think your résumé is weak in any way, with, say, a gap in your work experience, many short-term jobs or the absence of a degree, consider including one or more testimonials that attest to the quality of your work and to you as a valued employee. If you can't cull them from letters of reference, ask peers and former employers for a brief statement about you as a worker and for permission to include it in your résumé. Sample résumés in books will show you how to present testimonials in your résumé. A professional résumé writer can also be of help here.

What are common mistakes that IT professionals make on their résumés? Misspelling product names – using, for example, AS400 for AS/400, CPM for CP/M, Hewlett Packard for Hewlett-Packard, PhotoShop for Photoshop, QuarkXpress for QuarkXPress, and Quattro Pro for QuattroPro. You can't pass yourself off as being "detail-oriented" if your résumé has a misspelling.

Another is including early software like Ami Pro, CP/M, DOS, Windows 3.1, WordStar and WordPerfect 5.1 in a list of your software proficiencies. Unless there is a particular reason for mentioning an old program, omit what is no longer relevant.

You also should quantify achievements in dollar amounts, percentages or other numbers. Achievements without numbers don't stack up well against those with numbers.

In practice, does substance trump style? Both substance and style are crucial in a résumé. If the substance is lacking and not what the hiring manager wants in a prospective employee, the applicant has little chance of getting an interview. If the substance fulfills or exceeds expectation but the style is poor and has mistakes, the applicant will probably be screened out in favor of another applicant with similar credentials and an impeccable résumé stylistically. Today's job market has a surplus of qualified applicants and fewer open positions, so stylistic weaknesses have become more critical.

– JAMIE ECKLE

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SharkTank

TRUE TALES OF IT LIFE AS TOLD TO SHARKY

Communications Breakdown

This big music, film and new-media festival attracts thousands of attendees – and it seems like they've all got 3G mobile phones. And they're all using them. And then, not surprisingly, the 3G network crashes. And that's when the real show begins. "Cellular vendor quickly slams in a patch, and mobile devices are back up," reports a pilot fish who works for a nearby city. "But our emergency dispatch call center goes down completely, leaving only the backup radio system to dispatch law enforcement, ambulance and fire department personnel. After fruitless internal troubleshooting, city officials frantically call the cellular vendor, asking 'Did you do anything?' Vendor insists it didn't but, after repeated questioning, admits to having implemented a patch without the usual prior notification. City personnel explain this on the evening news: The vendor implemented a patch that we were not notified of and could not test. High-level vendor officials apparently have a talk with the TV station management, because by the late news that night, the story is that the city was not up to date on its software version and that's why the patch crashed our systems. Um, no – it wasn't the most recent version, but it was still a supported version."

Close Enough

This big manufacturer's internal phone system is getting old, and there's sometimes static on the lines. "To make things worse, most people receive calls using the speakerphone option, which worsens the situation with background noise," says an IT support pilot fish on the scene. This all comes into play when a few shift mechanics who refuse to log into their e-mail accounts once again forget their passwords. "After 90 days, IT support always gets a list of users whose accounts are slated for deletion, and I request that their e-mail passwords be sent to me so I can relay them to the area managers by phone. This time, one call goes like this. Me: The password is B-E-C-5. Manager: Was that D-B-C-5? Me: No, that's B as in boy, E as in Edward, C as in Charlie, 5. Manager: OK, so that's B as in boy, E as in Edward, C as in Charlie, and 5 (pause) as in 1, 2, 3, 4, 5."

Do as I Say, Not as I Do

Company's security team has developed guidelines for the use of blogs by employees, according to a pilot fish there. "I had to laugh out loud when I saw the last two points in the list," fish says. "They were: 'Check spelling and grammar. Misspelled words can damage the credibility of your message' and 'Click this link to corporate guidelines for glogs, specirfcally about Ethics, Etiquette, and Legal Stuff.' Oh, and by the way, the link wasn't live."

■ *Sharky's only got one guideline: Send me your true tale of IT life at sharky@computerworld.com. You'll get a stylish Shark shirt if I use it.*

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CHECK OUT Sharky's blog, browse the Sharkives and sign up for Shark Tank home delivery at **computerworld.com/sharky.**

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OPINION

Sharon Machlis

In Recession, Take Time to Save Time

FOR THOSE of us still lucky enough to have jobs during this Not Quite a Depression (Yet), the cratering economy has likely affected our workdays in one of two ways. In places like luxury stores or high-end brokerages, some workers find that their tasks have dwindled in step with the number of people still shopping for $3,000 suits.

Those employees are desperately trying to look busy as their workloads plummet.

I don't know any of those people.

For the rest of us, the financial meltdown has intensified the existing mantra to "do more with less." To-do lists are multiplying as resources evaporate and profit-strapped companies scale back on investments that could help employees be more productive (like replacing aging computer systems or upgrading ancient software).

So it's up to savvy IT professionals to use the technology they already have not only to boost productivity, but also to make the workplace a little less grim.

One simple way to achieve this is to invest time in training.

True story: I recently spoke with someone (not at my company) who maintains a Word document list of events for her department. It's sorted by place, but some people would like a version that's sorted by date. Keeping two versions would add to her workload at a time when she already has more to do, she said. The solution, of course: Someone in her IT department told her to keep it as an Excel spreadsheet. Once he sets her up, filling in the grid will become an easy, time-saving task.

OK, that's a painfully simple example. But how many other applications are out there on our coworkers' systems, underused because people don't know about available features that could help them? How many people don't know how to create e-mail filters or Word macros or simple databases that could save them hours over the course of a year or two?

■ Offering some simple, informal training could really help. But who has time for that?

Offering some simple, informal training could really help.

But, you ask, who's got time for that? Like executives who can't invest modest sums now for big savings down the road because money's so tight, we can't find a few hours for giving (or taking) training because time is so scarce.

It's the same story with scripting. How many people in our companies perform the same tedious tasks each week or month, putting together reports that could be partly or mostly automated if someone had the time to sit down and write a few scripts? Apple's Sal Soghoian tells the story of his Aunt Sarah who, after a big family gathering, told him, "I don't have time to learn how to use the dishwasher. I'm busy washing dishes."

So it is with finding the time for automating repetitive tasks. Who's got a couple of hours to invest now, even if we know it would save many hours in the future? The stress-inducing project list needs to be dealt with now; tomorrow's time crunch is a worry for another day.

But I'm convinced that for the still-employed, one of the best ways to survive the recession with mental and spiritual health intact is to find a way to make those time investments.

Few of us have the power to loosen up bank lending policies, add head count to the corporate payroll or create a financial system that better balances long-term needs with short-term pressures. However, we can all try to be more forward-thinking in our own universes.

So here's a proposition for you: Think of a few ways existing technology could help improve a creativity-to-tedium ratio — either yours or a colleague's. Then, the next time you're frustrated by our macroeconomic meltdown, tackle one item on your list. If nothing else, you might make someone's day a little more pleasant. And these days, that's nothing to sneer at. ■

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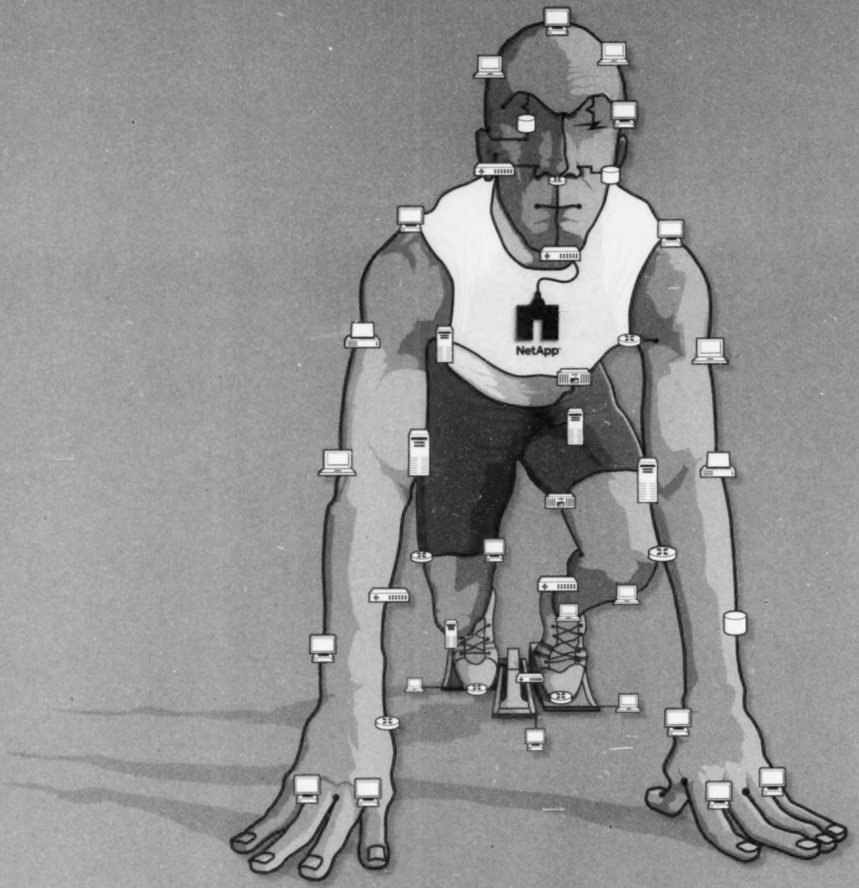

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